THE

ELECTRICAL REVIEW.

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ELECTRICAL REVIEW.

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(J. A. BERLY'S).

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THE STRIKE CLAUSE.

WITH rumours of a coal strike in the air, it is necessary for many a manufacturer to see whether there is a strike clause in his contracts.

The possibility that delay may be caused by a strike has compelled contractors to insert a clause by which they are excused from liability for such delay as may be attributable to stoppage of work by the men in furtherance of a trade dispute. The growth of trade unionism has rendered this course absolutely essential, for if the men knew that by ceasing to work they could involve the employers in an action for breach of contract, they might press this advantage, with disastrous consequences.

Questions of some nicety frequently arise as to the interpretation which must be put on a clause of this kind, as it is not usually confined to strikes, but applies also to "lock-outs, labour disputes and other stoppages." The doctrine of *ejusdem generis* is generally applied by the Courts in order to place some limitation upon the meaning of the word "stoppages."

In the case of Stephens *v.* Harris (56 L.J., Q.B. 616) it was held that the term "strike" in a charter-party must be used in the ordinary sense of a strike against the employers. The abandonment of their work by miners through dread of cholera does not bring the charter of a ship within the exception in a charter-party against "hands striking work."

In Grant *v.* Corridale (9 A.C. 470) the question was whether loading was prevented by frost in such a way as to excuse the charterers. It appeared that by a charter-party a ship was to proceed to Cardiff, East Bute Dock, and there load in the customary manner, from the agents of the freighters, a cargo of iron. "Cargo to be supplied as fast as steamer can receive, ... time to commence from the vessel being ready to load and unload and 10 days, on demurrage, over and above the said lay days at £40 per day. Except in case of hands striking work, or frosts or floods, or any other unavoidable accidents preventing the loading . . . in which case owners to have the option of employing the steamer in some short voyage trade until receipt of written notice from charterers that they are ready to resume employment without delay to the ship." The ship arrived at the East Bute Dock and loaded part of her cargo. A frost then set in, and made a canal which communicated with the dock impassable, so that the remainder of the cargo, which was ready at a wharf on the canal, could not for several days be brought in lighters to the dock. The cargo could not have been brought into the dock by carting or otherwise at any reasonable expense. The dock itself was not frozen over, and if the cargo had been in the dock the loading might have proceeded. It was decided that the frost did not "prevent the loading" within the meaning of the exception.

Engineering contracts usually contain a condition binding

the contractor to complete the works within a fixed time; and when an allowance is to be made if the works be delayed by reason of any inclement weather, alteration, or causes not under the contractor's control, or in case of strike or lock-out affecting any of the trades concerned, it is advisable, instead of stipulating that the contractors are then to complete the works within such time as shall be reasonable, to provide that the contractors shall do so within such time as the engineer shall consider to be reasonable, and shall from time to time in writing appoint. This object may be effected by adding the following proviso to the well-known forfeiture clause: "Provided always that, in case the contractor shall be prevented from complying with this agreement, the engineer may extend the time for the completion of the works for such reasonable period as he may think fit, and shall in writing certify to be necessary."

A case before Mr. Justice Wright in 1904 involved a novel point—namely, whether a holiday arbitrarily taken by the men without the consent or interference of their employers is a "stoppage" within the meaning of the ordinary strike clause in a charter-party. In the case in question (*in re* an arbitration between Allison & Co. and Rose Richards) the facts were that the plaintiffs entered into a charter-party to carry coal on their steamship to Leghorn. The "lay days"—*i.e.*, days within which the loading was to be complete—excluded delays occasioned by strikes, lock-outs, and also Good Friday and Easter Tuesday and certain other holidays. The colliers belonging to the colliery from which the coal was taken gave notice that they would work on Good Friday and the next day, but that they would take the Wednesday after Easter Monday as a holiday, and on that day all work was stopped. This Wednesday was not expressly referred to in the charter-party. The plaintiffs brought suit to recover demurrage on account of the work not being prosecuted on Wednesday. It was submitted on their behalf that the refusal of the men to work on that day could not be said to be a strike by the men, inasmuch as there was no dispute with the masters, the latter doing nothing either by way of approval or disapproval. The fact that Good Friday and Easter Tuesday were expressly mentioned in the contract made it plain that it was intended that days not so mentioned, such as Wednesday, should be excluded. Mr. Justice Wright, however, refused to adopt this view. In giving judgment he said:—"This was not a holiday recognised by the masters, nor is it within the exception contained in the charter-party. On the point that it is a cause 'beyond the charterer's control' there is little authority beyond the case of Richardson *v.* Samuel. Literally, of course, this was such a cause, but it was there held that the cause must be *ejusdem generis* with the causes enumerated in the charter-party. I am inclined to think, however, that a holiday taken by the men without the concurrence of the masters is sufficiently *ejusdem generis* with stoppage of work caused by a dispute between masters and men, and, perhaps, of strikes; and that it is therefore within the exception." His decision was subsequently affirmed by the Court of Appeal.

It follows from this that the declaration of stop days by workmen is a matter for which their employers cannot be held liable, if they are protected by a clause similar to that above described.

Electricity and the Production of Pig-iron.

THE formation of a company for the purpose of laying down electric iron-works in Sweden reminds us at the same time of a new field for the application of electrical machinery, and of the possible menace to our manufacture of iron and steel offered by the electric furnace in conjunction with cheap water-power.

We understand that electrical energy for these works is to be supplied for about 30s. per annum per horse-power, a price which cannot be approached by the largest and most modern steam or gas generating stations, as, even if fuel cost nothing at all, the heavier capital and attendance charges would increase the cost of energy to more than double this figure. Yet we find electric furnaces in operation for the manufacture of steel where the necessary power is developed from steam or gas.

At first sight a far higher efficiency would appear to belong to the existing method of burning the fuel direct in a furnace, and generally speaking, such is the case, but the difference in the ultimate results is not sufficiently marked to counterbalance other advantages in the manufacture of special steels; and as regards the production of pig-iron, the electric furnace bids fair to be a commercial success where cheap water-power is obtainable.

Fortunately, perhaps, for the conservation of our iron and steel industry, the number of situations where water-power can be produced and sold for 30s. per H.P.-year is limited, and as the demand rises the value of the water rights is likely to increase. Then again, the necessary supplies of raw materials must be cheaply available, together with transport facilities for the finished product, and we doubt whether the number of sites meeting these requirements is sufficient to cause any alarm in this country. On the other hand, a start is being made, and there is little doubt that when the scarcity of fuel causes a rise in price, countries possessing cheap water-power will have a distinct advantage over their less fortunate neighbours as regards any manufactures which require electric current.

In the meantime, British capital may be profitably employed in exploiting suitable water-powers in Norway, Sweden, Canada and elsewhere, whilst our manufacturers of turbines and electrical apparatus ought to be able to secure a large proportion of the orders for the requisite machinery.

The Tying Clause in Agreements Relating to Machinery.

A CASE which is reported in a recent number of the *Law Reports* throws some light upon the validity of the "tying clause" in agreements for the lease of machinery. It appears that in 1903 and 1904 a company known as the United Shoe Machine Co., of Canada, leased certain machines made and used for certain processes in the manufacture of shoes to one Brunet and others. Each agreement of lease contained a clause which prohibited the use by Brunet, in the manufacture of shoes, of any machine not leased by the company. Some additional leases were granted to Brunet by other persons for certain ancillary processes in the same manufacture. The company, relying on the tying clause, called upon Brunet to remove these machines, and upon his refusal, brought an action in the Supreme Court of Quebec to compel him to discontinue the use of these machines. Brunet pleaded that the company, by false representations that they were patentees in respect of their machines, had induced him to take the leases, and that the covenants therein, by reason of their unjust and oppressive nature, and of the practical monopoly which the appellants had acquired in Canada in the manufacture and supply of shoemaking machinery, were in restraint of trade. The Supreme Court in Canada came to the conclusion that the company had made the alleged representations, and that, as the tying clause was in restraint of trade, each agreement containing it was void.

The Privy Council, however, has reversed this decision, holding that as the respondents had not repudiated the

leases after discovery of the alleged false representations, but had continued to work the demised machines and paid the royalties reserved, they had elected to treat the leases as subsisting, and could not afterwards avoid them. It was held also that the covenants were not in restraint of trade. The shoe manufacturers of Canada were at liberty to hire or not to hire the appellants' machines on the applicant's terms as they pleased. "If," says Lord Atkinson, in expressing the opinion of the Privy Council, "the monopoly established by the appellants and their mode of carrying on their business has oppression, as is alleged (upon which their Lordships express no opinion), then the evil, if it exists, may be capable of cure by legislation or by competition, but in their view not by litigation. It is not for them to suggest what form the legislation should take, or by what methods the necessary competition should be established. These matters may, they think, be safely left to the ingenuity and enterprise of the Canadian people."

Attempted National Boycott.

The Dublin Industrial Development Association is one of the most active of those bodies which think that they are serving the National cause in the best possible manner by promoting the grand internal mutual sustentation scheme, as practised by the well-known islanders who lived by taking in each other's washing.

This Association is always "wanting to know" why such and such an article used by public institutions is not made and bought in Ireland, and it uses every means to persuade those who let contracts that they will be benefiting themselves and everyone else in Ireland (except, let us hope, the Interloper!) if they stipulate that all materials are to be Irish made.

As a trade organisation, we believe that the Association is doing good work, in which case its existence is justified; but it is not possible in reason to carry on a propaganda of such a nature without a suspicion of terrorism, which, as we all know, is a weapon used largely for other so-called national purposes in the same country.

We do not believe that the industrial re-development of Ireland, which is being fostered with extraordinarily gratifying results by the real Irish patriots, can be helped in any degree by the restriction of competition which lies at the root of the activities of the Dublin Industrial Development Association, and it will surprise no one to hear that the L.G.B. is advising those public bodies which show a desire to act up to the ideals of the Association that they may get themselves into serious trouble. In a case reported recently, for instance, the Guardians of a certain Irish Union are warned that the L.G.B. may be obliged to refuse recoupment upon expenditure on annual supplies, for which competition was restricted to Irish firms only, and to declare any of the contracts to be null and void.

The D.I.D. Association advised the Irish public boards that no action could be taken by the L.G.B. auditor in the matter of Irish tenders being accepted, so long as the advertisements for tenders and the tender forms themselves stipulated for Irish goods, but the L.G.B. holds that public bodies cannot safeguard themselves in the manner described.

The "General Consultant."

Probably no class of engineer is more subject to the attacks of ignorant critics than the consultant, his lack of intimate acquaintance with the special points of all kinds of machinery being frequently held up to ridicule.

In this connection we are dealing more particularly with what may be called the "general practitioner," who is called in to give advice upon prime movers of all descriptions and over a wide range of mechanical appliances.

The specialist in motor-cars, electricity generating stations, gas engines, &c., should, of course, be well posted in the details of the work he undertakes, but the consulting engineer who is appealed to by the general manufacturer, estate agent and the like, can only have a more or less superficial knowledge of the widely varying subjects upon which his opinion is sought. Such a man, if he be wise, will never give verbal advice; he requires time in which to think matters over and to consult data which he has gradually accumulated from different sources.

Two most important endowments for the general consultant are: first, an instinct telling him where his information is incomplete or out of date; secondly, the ability to make use of the requisite data when obtained.

A sound general engineering training and some elementary knowledge of science are necessary, but it is impossible for any one man to carry at his fingers' ends all the special points pertaining to every prime mover or machine used by the man or firm that seeks general advice.

An accumulation of useful data is absolutely essential to the success of any consulting engineer, whether he be a specialist in one branch or willing to give an opinion on general engineering matters.

Text and pocket-books, although they have their uses, are not sufficiently up-to-date for reference on many important points, and it is necessary to supplement them by a store of personally selected cuttings and notes.

In addition to the information which comes from any work undertaken, many useful tips may be gleaned from the technical Press, more especially from the papers read before the various engineering institutions and the discussions thereon. The discussions should receive particular attention as they are contributed to by experienced men who often give the results obtained in everyday practice. Then, again, several journals make a feature of practical difficulties and their solution, these columns being largely occupied by the suggestions of practical men who have no other opportunity of giving publicity to their opinions.

Independent tests on machinery form another source of valuable information, but careful judgment must be exercised in separating the "wheat" from the "chaff," as many reported trials are undertaken for the express purpose of puffing some particular appliance, unfavourable figures being suppressed.

By these means, with the help of a good system for storage and indexing, an engineer can compile an up-to-date reference bureau suited to his particular needs, and of far more value than any collection of text and pocket-books.

Finally, the general consultant may be strongly recommended to study the financial side of engineering problems, together with local conditions, as these features are of the utmost importance to the success of any new scheme. Money is often spent on elaborate devices upon which the capital charges and maintenance more than counterbalance any saving in fuel or labour. It should always be borne in mind that a complicated arrangement of plant which may be right and proper under one set of conditions will often be a commercial failure for an apparently similar purpose.

Natural Power.

Surprise is often expressed at the small extent to which natural power from rivers, winds and tides, is made use of in this country. A river or stream appears, at first sight, to be an almost ideal source of power, but when the commercial aspect of the problem is studied, certain serious drawbacks are discovered.

Unless favoured by exceptional natural conditions, the capital cost for a water turbine installation is far in excess of that involved by the use of steam or gas; but a more serious difficulty is the uncertainty of the supply of power during droughts or floods.

As regards uncertainty, wind and tidal power compare favourably with that derived from a river or stream. It might be supposed that no source of power could be more uncertain than the wind, but when statistics are examined we find that storage for a few days will provide for any calm periods likely to occur.

For small powers, the modern wind motor is likely to come into extended use.

If some method of energy storage much less costly than the secondary battery could be developed, almost unlimited water-power would be available from the rise and fall of the tides, whilst large wind engines could then successfully compete with power produced from oil or coal.

D

PROTECTION OF OPERATORS FROM SHOCK.

By S. LEES.

The new Home Office electricity regulations will doubtless be the means of rousing in many quarters a proper sense of responsibility, where formerly, utter indifference to the protection of plant operators existed.

Although, of recent years, there has been a gradual tendency in some of the better-appointed stations, at least, for the greater protection of operators from risk of shock, yet the general impression still remains that direct current can be handled with impunity.

Most forms of protective guards, other than floor-insulating devices, consist of a system of metal guards, usually of the woven-wire or perforated-sheet variety. These types of guard are cheap and easily fitted, and make a good enough job where appearance is of secondary importance. Where the latter condition is a desideratum, as, say, in engine-room work, the conventional bright guard railing is most commonly used. This practice, which, from time immemorial, has obtained in the fencing-in of almost every kind of running machinery, and particularly steam plant, has been religiously followed in the case of electrical machinery and apparatus, and one sees, even at the present day, electrical plant being installed with the same arrangements of guard railing as were in vogue over a decade ago. A case in point is a modern central station, where two similar generating sets are fitted with metal guard railing. While in one set the railing is little over knee high, in the other set scarcely an effort is required to get under the *fence*. Another case is where the guard railing is placed so near to the commutators and other live metal work in the vicinity as to render its presence a standing source of danger to the operator. If some form or other of guard railing is considered necessary for central station plant, then additional means should be provided whereby the operator is assured of more adequate protection when working on live metal, as, for instance, when carrying out some urgent repair or adjustment, or, when giving the constantly required attention to a running commutator.

With a view to avoiding eventualities of the kind mentioned, some time ago the writer had insulating sleeves of vulcanised fibre tubing fitted to the guard railing of a number of direct-current sets. As a rule, it will generally be found to provide sufficient protection if the highest or top runs of the guard railing are insulated, and it is obviously better to take the sections of rails adrift to effect the conversion, instead of splitting the fibre tubing.

THE IMPOSSIBILITY OF ALL "GETTING ON."

[COMMUNICATED.]

If the more responsible and better-paid appointments were given away strictly in age order, the process of rising from a junior to a senior position would be a very slow one, as the upward movement could only occur in response to the death or retirement of those at the top. Yet from our earliest infancy we are all urged to put forth our best efforts to "get on," and people who have been successful are never tired of telling those below them that they must not only do the work they are paid to do, but as much more as physical strength and the demands for sleep will permit.

Those of us who have been "through the mill," and who look back upon a more or less successful career, must be impressed with a feeling of great thankfulness that the above advice is not generally acted upon. If it were, business life would be so strenuous that only the young and strong could survive, and the differences in competency—now accentuated by idleness, devotion to sport, hobbies, &c.—would be very much lessened. This feature would have the effect of decreasing the value of merit in favour of promotion by influence, as small differences in ability are apt to be overlooked where influence is concerned.

British workmen long ago realised the danger of competition amongst themselves, and combined to secure higher wages and better conditions. It is a question whether the office and works staffs are not drifting towards a condition which will require some similar form of protection, this condition being nearer at hand in the manufacturing branch of electrical engineering than is the case with any other industry.

Boards of directors are continually grumbling at what they are pleased to term "unproductive" expenditure in the works upon draughtsmen, cost clerks, &c., whose work is every whit as essential to the manufacturer as that of the men who attend machine tools or assemble the finished product.

This dissatisfaction on the part of the directors passes downwards until it reaches the heads of departments, who are responsible for the number of assistants employed, with the result that every artifice is introduced to get more work out of the staff, so that a less number may be required. In the drawing office overtime is instituted, whilst other members of the staff who have defined duties to perform can only get through them by working long after recognised hours. As regards holidays, the principle has long since been accepted that those who are left behind must do their own work and those of their *confrères* who are away; in other words, no holidays are really given at all, each man having to do as much work as if he continued right through the summer without a break.

If these severe conditions entailed additional pay, as is the case with the workman, they would not carry with them such a sense of injustice; but, unfortunately, the contrary may almost be said to obtain, staff salaries having shown a strong tendency to decrease of late years, excepting for those at the very top.

If combination ever takes place amongst office and works staffs with a view to ameliorating the conditions indicated above, it is to be hoped that this object will be achieved without engendering that feeling of antagonism towards the employers which has been such a conspicuous feature in connection with trade unions.

On the other hand, one employer cannot afford to make concessions alone, and the whole body of employers would only yield to strong pressure. Furthermore a feeling of mutual respect always follows a tough struggle, and cannot be aroused by any other means.

CORRESPONDENCE.

Letters received by us after 5 P.M. on Tuesday cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

Increased Output of Boilers.

Referring to your leading article of the 9th inst., the advocates of complicated boilers can have no knowledge as to the very small margin of possible improvement that is left with the simplest of all boilers, when correctly fired.

The Lancashire boiler is a standing contradiction of all theory that advocates high gas velocity and obstructed flow of gas. Its perfectly plain, unobstructed, large diameter flues transfer some 70 per cent. of the total available heat; the remainder of the work is done in bottom and side flues of large unobstructed areas. Yet the escaping gases are generally reduced to within 250° F. of the temperature of the steam in the boiler, and no addition to the heating surface would cool the gases much further; the only method left is to use an economiser, having a far lower temperature than that prevailing in the boiler.

Water-tube boilers of the simplest types also leave no real margin for improvement in efficiency when correctly fired; but they usually have far more total heating surface than the Lancashire boiler employs to reduce a given volume of gases down to the same practicable limit of temperature.

Normal rates of combustion, say 20 to 30 lb. of coal per sq. ft., have been found the most economical, all things considered; but there is no difficulty in raising the output by burning more coal; and as you point out, an increase in the furnace area is a far more practical method than forcing the rate of combustion. But a very practical objection is that forced duty of boilers reduces the reserve of steam and water, and is very apt to lead to wet steam and consequent loss of superheat. *Other things being equal*, the higher the gas velocity, the less must be the time available for heat transfer; and there is ample evidence that an increased gas velocity always involves a loss in efficiency, and never a gain. At the same time, the influence of gas velocity is quite trifling in comparison to the influence of temperature difference on heat transfer. If the combination is kept constant, viz., if the admission of air per lb. of combustible is unchanged, then the rate of combustion can be doubled, and the boiler will absorb very nearly the same proportion of heat from the doubled volume of gases at doubled velocity, without any considerable rise of final temperature. But if the increased volume is due to admission of excess air, then the reduced temperature difference involves a very serious loss, both in the temperature and in the volume of the escaping gases. The theory that an excess of air in the furnace gases does not seriously diminish efficiency, is opposed to all experience.

The justification of mechanical firing and mechanical draught is that they permit a much better regulation of air and fuel than is practicable with intermittent hand firing, thus improving boiler efficiency and increasing the output per pound of coal burnt.

But it is very doubtful if it pays to work boilers at high duties, in view of the importance of dry steam; and it is very certain that nothing whatever can be gained by abandoning simple and accessible boilers for complicated ones, or by neglecting the really important question of correct firing methods, in the illusion that there is any other way of improving boiler efficiency.

Scrutator.

New Home Office Regulations.

The letter of Mr. Conradi in your issue of the 16th inst. misses the point. He refers to the class of fittings now flooding the market, as a direct result of the Regulations, which are specially constructed to avoid the necessity of the earth wire. My letter had reference to the still more numerous class of fittings already in existence which do require an earth wire, and which the Regulation No. 13 is obviously framed to deal with. Mr. Conradi might do better if he had another look at the Regulation in question.

F. Johnston.

Holywood, *July 20th*, 1909.

Cost of Living Abroad.

I shall be greatly obliged if you, or one of your correspondents, will give me some idea of the cost of living on the West Coast of Africa (Gold Coast).

High Tension.

[One who has been there on several occasions informs us that in coast towns the minimum cost of living is about £20 per month; in the interior it is very much greater.—Eds. E.R.]

Electric Lighting Legislation.

Referring to my letter, which you were good enough to insert in your last issue, I am glad to be able to report that, as a result of the efforts which have been made, substantial amendments have been obtained in the Bill now passing through Parliament.

Clause 6 has been altered so as to make it quite reciprocal between local authorities and companies.

Clause 13—relating to audit of accounts—has been struck out, and the following clause has been substituted:—"The Board of Trade shall from time to time make a return to Parliament giving such particulars as they may think proper with regard to the reports made by any auditors appointed by them to audit the accounts of any undertakers, and any action taken on such reports by the Board and by the undertakers."

Clause 2 has also been amended with regard to sub-stations.

The Bill passed the Standing Committee yesterday, and until we see a revised print we cannot be sure that all points have been satisfactorily met, but it is believed that there will be no further necessity to oppose the passing of the Bill.

The Bill is not entirely satisfactory, because many important matters referred to by the Select Committee of 1898 have not been dealt with, but the Bill contains some good points, and the particularly dangerous clauses have, it is hoped, been satisfactorily amended.

E. Garcke.

London, W.C., *July 21st*, 1909.

Preference to Home Manufacturers on Public Contracts.

I understand that Germany has legislation which enacts that Government, municipalities, and such corporations as tramway, railway, gas and water companies, enjoying public charters, must up to a certain margin favour the home manufacturer. As this country seems to be very undecided about the substitution of tariffs for the old Free Trade policy, the present Government might well consider the question of introducing legislation on similar lines.

The new British patent law dealing with manufacture is of the nature of a retaliatory measure, drawn up on similar lines to that of Germany, and it certainly looks as if it is going to be a help to industries in England. If the Government would now pass a law providing for preference being given to home manufacturers in all public contracts, it would be a helpful measure, and the Continental people could not complain, as it would be merely copying what they have done. Such legislation would be likely to have a far-reaching effect, because Colonial Governments would very likely follow suit; the sentiment favourable to home manufacturers is very pronounced, as shown by preferential tariffs.

I am doubtful of the wisdom of this country going in for wholesale tariff reform, but surely few people could object to legislation such as is indicated above.

Some may say that it would be simply tariff reform under another name. Very well, they can call it what they like; I simply put it forward as a method of recording and fixing by law a sentiment which already exists.

E. K. Scott, A.M.Inst.C.E., M.I.E.E.

Orpington.

Earth-Indicating Device.

With reference to "W. H. B.'s" inquiry and the letter addressed in response to the same in the current number, respecting the Marlow & West leakage detector and alarm, we beg to hand you under cover herewith particulars of our automatic earth leakage switch, which you described in your columns some few months back. If your correspondent will furnish us with particulars and exact details of what he is in need of, we shall be happy to go into the question with a view to meeting his requirements.

Nalder Bros. & Thompson, Ltd.
F. H. Nalder, *Managing Director.*

London, E.C., *July 26th*, 1909.

Peculiar Accident to a Tungsten Lamp.

If the glass bulb was pierced by one of the metallic supports being projected from its place with considerable force, as suggested in the description in your issue of 23rd inst., this incident appears inexplicable; but if we may imagine the bulb to have had a film of moisture on the outside at the time, it would form a condenser of practically the Leyden jar type, and under such conditions it is quite conceivable that a spark between the metal filaments forming the inner and the film of moisture forming the outer coating might pierce the glass. I have not read the account in your Milan contemporary, and do not know whether lightning actually penetrated to the electric light system, or

whether the blowing of the fuse was due merely to a surge caused by a flash striking some neighbouring place, but from the fact that the fuse was blown it is obvious that a rush of electricity—or, in other words, a wave of very high potential—passed along the wires, and the spark at the lamp end, given a film of some kind on the exterior, would appear to be a natural consequence. It would not, I think, be difficult to pierce the glass of a Leyden jar under such conditions.

Sir Oliver Lodge has shown that a remarkably long spark can be obtained at the far end of two leads owing to the surging effect of a discharge, and I described and reproduced experimentally, in a lecture before the Royal Engineers at Chatham in 1906, a case where a fire was caused in a building near a lighthouse that was struck by lightning. In this case the lead was a gas-pipe passing underground, but rising inside a corrugated iron building, and the insulator pierced was air instead of glass; but the principle involved was practically the same as what I suggest may have happened with the lamp.

Alfred Hands.

London, E.C., *July 24th*, 1909.

[Our information is limited to the particulars contained in the extract from our contemporary. If Mr. Hands's explanation is the correct one, the incident forms an excellent testimonial to the efficiency of the insulation of the wires and fittings employed.—EDS. E.R.]

The Prevention of Smoke.

Our Mr. A. W. Bennis is away on holiday at the present time. Meanwhile we think we may say, on behalf of Mr. Bennis, that it appears to us that Mr. Wilfred Yorke's letter was written under misapprehension, and the more particularly we feel this to be the case as we are not willing to attribute to him wilful sophistry.

Pro **Ed. Bennis & Co., Ltd.**
E. M. S.

London, S.W., *July 23rd*, 1909.

What is a Telegraph?

The Postmaster-General seems to take upon himself to decide that a telegraph is the same thing as a telephone whenever it suits his purpose to do so. When I was living in Kent, in a village that had no telegraph office, the P.M.G. agreed to establish one on my guaranteeing a certain sum per annum towards the expenses. When the office was opened it was found to contain a telephone instead of a telegraph, with the result that innumerable mistakes occurred. On one occasion a friend of mine telegraphed to his son in South Africa "Await letters." The code word actually transmitted stood for "Come home at once." This was considered an excellent joke, but I wrote to the General Post Office calling attention to the wording of their contract, in which they undertook to supply a telegraph, and complained that this part of the contract had not been adhered to. It was pointed out to me that by the decision of the Courts a telephone and a telegraph were held to be the same thing. I was quite familiar with the decision in the case of the Postmaster-General *v.* National Telephone Co., and that it was on this decision that the P.M.G. relied. I asked if it had ever been decided that the two instruments were the same, except for the purposes of the Postmaster-General's monopoly? I have never been able to obtain an answer to this very simple question. The recent decision of Mr. Justice Dodd, which you quote, goes some way towards supplying the answer.

Wilson Noble.

Wokingham, *July 26th*, 1909.

Chichester Electrified.

I have always regarded your paper as one of the principal champions of the industry upon which we are all dependent. I must, therefore, express my surprise at your publication of anything which might be used to the detriment of a new undertaking.

Among engineers, the value of the criticism of these gentlemen, whose time might be much better employed in looking after their own business, will be easily appraised, but in the eyes of laymen, even mud sneeringly thrown from behind the stone wall of anonymity will often receive notice.

It speaks well for the organisation of the intelligence department of our friends the gas company, that the letters in your columns have already found their way into our local paper (copy enclosed under separate cover); but for this fact, no notice would have been taken of such unworthy criticism.

I am interested to hear from "Not too Cheap" that our supply is dependent on a single feeder cable. He is evidently ignorant of the use of distributor cables when brought into the works, and of the fact that, in well-designed systems, a separate duct is usually provided for additional feeder cable when the load warrants the additional expenditure. This knowledge may help him when he is called upon, if ever, to design a scheme.

If your correspondents really desire information on any other points, if they adopt the usual professional and gentlemanly course they will write direct to the consulting engineer, who will no doubt courteously satisfy them that every necessary precaution has been taken.

R. V. Weare,
Resident Engineer.

Chichester Electricity Works,
July 22nd, 1909.

[We hardly need say that in publishing the letters in question we had no wish or expectation to injure the Chichester undertaking in any way, and we are surprised to learn that they have been used for that purpose. As regards the broader question, our correspondent would ask much if he were to claim for his, or any, works immunity from criticism; but the critics ought to make sure of their ground before taking up the cudgels.—EDS. E.R.]

The Steamcubator.—We have received a pamphlet and illustration of this new appliance, which is made by the STEAMCUBATOR ENGINEERING CO., 30, Cross Street, Manchester. Essentially it is a steam drier applicable to Lancashire boilers. It consists of a helical coil of steam pipes placed in the back end of each flue and extending for a length of about two rings of the Adamson type. The end of the helix nearest the furnace is fed by a centrally placed horisontal pipe, which is brought from the steam main. The rear end of the helix is connected to the dry steam main. There are shown nine complete coils in each helix, and it is claimed that a boiler thus fitted will be increased 50 per cent. in steaming capacity *under average working conditions*. The italics are ours. We do not deny the statement, because we do not know what is intended to be conveyed by average working conditions. It is also *claimed* that coal may be economised to the extent of 30 to 40 per cent.

The fact that we mention this *claim* will not, we trust, be taken as marking our belief in the statement. The apparatus is at most a superheater of somewhat limited surface. It will probably dry the steam, but we do not look for much superheat from it, and the statement of fuel economy is therefore much too high, in our opinion. We presume it is a draughtsman's error, but should point out that the flue tubes are not such as are usual in Lancashire boilers, and the coils would be much smaller than are shown in the illustration. They would also be better exposed to the heat than they would be as shown. We cannot see why, if steam is raised to an extremely high temperature, it should be less chemically active with iron when in large volume, than when in small volume. Nor will the effect be any different on the engine cylinders, &c. Temperature is temperature, whether in 1 on in 41 cb. ft. of steam.

We say nothing against the apparatus as such; but we think the claims and statements in the circular should be considerably modified, for they are practically impossible and too general. Suppose we take a boiler having an efficiency of 75 per cent.; let us add to this the 30 per cent. economy that is claimed for the new device, and we get 97·5 per cent. of thermal efficiency, leaving 2½ per cent. for radiation losses, chimney gas temperature, and imperfect combustion. Next take a boiler with an efficiency of 40 per cent., and add the new apparatus; the new efficiency will be 52 per cent. These two statements show the uselessness of such generalisations as are put forward with the positiveness of dogma. Assume that the fuel saving is measured by the engine duty; then too much is claimed for superheat, especially in the absence of any independent figures as to the degree of superheat that the apparatus will give.

TRADE STATISTICS OF JAPAN, 1908.

THE following figures, showing the imports of electrical and similar goods into Japan during the year 1908, are taken from the recently issued official trade statistics. The figures for 1907 have been added for purposes of comparison, and notes of any increases or decreases are given:—

	1907. Yen.	1908. Yen.	Increase or decrease. Yen.
Lubricating and other heavy oils.—			
From Great Britain ...	10,165	19,787	+ 9,622
„ Germany	10,298	54,549	+ 44,251
„ United States ...	580,807	841,646	+ 260,839
„ Other countries ...	1,331	10,513	+ 9,182
Total ...	602,601	926,495	+ 323,894
Galvanised-iron wire.—			
From Great Britain ...	16,818	30,589	+ 13,771
„ Germany	1,187,109	1,533,081	+ 345,972
„ Belgium	106,055	31,975	— 74,080
„ United States ...	109,664	93,782	— 15,882
„ Other countries ...	7,275	48,673	+ 41,398
Total ...	1,426,921	1,738,100	+ 311,179
Iron and steel (plates and sheets).—			
From Great Britain ...	5,366,714	3,248,599	— 2,118,115
„ Germany	687,046	881,335	+ 194,289
„ Belgium	1,252,023	556,318	— 695,705
„ United States ...	206,734	153,838	— 52,896
„ Other countries ...	32,041	13,783	— 18,258
Total ...	7,544,558	4,853,673	— 2,690,885
Rails.—			
From Great Britain ...	483,688	384,793	— 98,895
„ Germany	1,579,110	2,193,132	+ 614,022
„ Belgium	379,134	85,637	— 293,497
„ United States ...	1,371,016	2,407,884	+ 1,036,868
„ Other countries ...	15,554	—	— 15,554
Total ...	3,828,502	5,071,446	+ 1,242,944
Building materials and posts for electric and like materials.—			
From Great Britain ...	1,251,814	1,974,779	+ 722,965
„ Germany	16,434	321,454	+ 305,020
„ Belgium	7,103	5,611	— 1,492
„ United States ...	857,285	1,525,354	+ 648,069
„ Other countries ...	16,251	30,969	+ 14,718
Total ...	2,178,887	3,868,167	+ 1,689,280
Submarine and underground cables.—			
From Great Britain ...	567,888	254,528	— 313,360
„ France	106,263	—	— 106,263
„ Germany	619,662	156,902	— 462,760
„ United States ...	39,188	8,847	— 30,341
„ Other countries ...	143	—	— 143
Total ...	1,333,144	420,277	— 912,867
Insulated electric wire.—			
From Great Britain ...	647,297	860,872	+ 213,575
„ France	104,710	108,736	+ 4,026
„ Germany	124,072	229,309	+ 105,237
„ Italy	17,687	18,980	+ 1,293
„ United States ...	234,403	228,680	— 5,723
„ Other countries ...	1,349	275	— 1,124
Total ...	1,129,568	1,446,552	+ 317,284
Railway passenger cars, goods trucks, and parts thereof.—			
From Great Britain ...	642,804	550,466	— 92,338
„ Germany	8,952	88,027	+ 79,075
„ Belgium	16,812	43,756	+ 26,944
„ United States ...	350,300	759,070	+ 408,770
„ Other countries ...	2,645	2,169	— 476
Total ...	1,021,513	1,443,488	+ 421,975
Parts of electric cars.—			
From Great Britain ...	27,012	65,291	+ 38,279
„ Germany	46,550	17,993	— 28,557
„ United States ...	478,034	378,751	— 99,283
„ Other countries ...	6,936	—	— 6,936
Total ...	558,532	462,035	— 96,497
Steam engines.—			
From Great Britain ...	727,159	1,058,431	+ 331,272
„ France	74,250	—	— 74,250
„ Germany	31,220	98,635	+ 67,415
„ United States ...	513,906	593,371	+ 79,465
„ Other countries ...	3,633	16,229	+ 12,596
Total ...	1,350,168	1,766,666	+ 416,498
Gas engines, petroleum engines, and hot-air engines.—			
From Great Britain ...	431,855	668,059	+ 236,204
„ Germany	34,333	236,234	+ 201,901
„ United States ...	66,899	50,413	— 16,486
„ Other countries ...	16,390	11,920	— 4,470
Total ...	549,477	966,626	+ 417,149
Steam turbines.—			
From Great Britain ...	655,896	511,072	— 144,824
„ Germany	33,699	67,315	+ 33,616
„ Switzerland... ...	1,427	28,891	+ 27,464
„ United States ...	309,058	135,521	— 173,537
„ Other countries ...	5,887	7,615	+ 1,728
Total ...	1,005,967	750,414	— 255,553
Electrical machinery.—			
From Great Britain ...	707,513	667,038	— 40,475
„ Germany	293,482	676,674	+ 383,192
„ Belgium	10,590	26,104	+ 15,514
„ United States ...	1,526,874	2,339,523	+ 812,649
„ Other countries ...	4,478	11,837	+ 7,359
Total ...	2,542,937	3,721,176	+ 1,178,239
Steam boilers.—			
From Great Britain ...	1,212,933	1,155,978	— 56,955
„ Germany	4,746	56,236	+ 51,490
„ United States ...	236,543	118,813	— 117,730
„ Other countries ...	10,007	690	— 9,317
Total ...	1,464,229	1,331,717	— 132,512
Lifting machines.—			
From Great Britain ...	717,238	845,797	+ 128,559
„ Germany	220,036	191,442	— 28,594
„ Belgium	6,217	10,447	+ 4,230
„ United States ...	129,647	91,492	— 38,155
Total ...	1,073,138	1,139,178	+ 66,040
Caoutchouc and gutta-percha, crude.—			
From British India ...	53,106	35,720	— 17,386
„ Straits Settlements...	315,265	205,161	— 110,104
„ Dutch India	133,486	335,545	+ 202,059
„ Great Britain ...	97,684	184,293	+ 86,609
„ Germany	11,357	8,022	— 3,335
„ United States ...	145,841	101,291	— 44,550
„ Other countries ...	13,975	16,546	+ 2,571
Total ...	770,714	886,578	+ 115,864
Belting for machinery.—			
From Great Britain ...	333,455	244,983	— 88,472
„ Germany	174,062	198,495	+ 24,433
„ United States ...	92,784	57,680	— 35,104
„ Other countries ...	10,583	7,470	— 3,113
Total ...	610,884	508,628	— 102,256

The exports of electric dynamos and electric motors from Japan in the years 1907 and 1908 were as follows:—

	1907. Yen.	1908. Yen.	Increase or decrease. Yen.
To China	60,766	105,564	+ 44,798
„ Kwantung Province...	112,205	129,319	+ 17,114
„ Corea	70,739	79,909	+ 9,170
„ Other countries ...	1,479	3,281	+ 1,802
Total ...	245,189	318,073	+ 72,884

Yen = 2s.0½d.

Home they Brought her Warrior, &c.—A consulting electrical engineer of well-known convivial habits met an old college mate, and wishing to keep up the friendship made in their youthful days, he addressed his old comrade in these terms: "Whenever you are in town, come and put up with me. No matter what the time may be, if I am not there just go in and make yourself at home. I shall be sure to turn up before daylight." Some little time afterwards the chum arrived in the West-End about midnight, and, remembering the cordial invitation, sought out his friend's diggings. A dim light flickered in the hall, and he gave the bell a long, long pull. Quickly he found himself faced by a landlady of stern and terrible aspect. "Does Mr. Watt live here?" he inquired in a faltering voice. "He does," retorted the she-dragon in a withering tone; "and you can just bring him right in!"

NEW ELECTRICAL DEVICES, FITTINGS, AND PLANT.

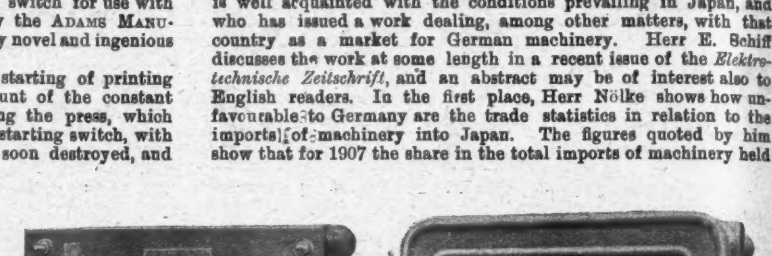
New Motor-Starting Switch for Printing Machines.

Particulars of a new type of motor-starting switch for use with printing machines have been sent to us by the ADAMS MANUFACTURING CO., LTD., of Bedford, which embody novel and ingenious features.

Every printer's engineer knows that the starting of printing presses is very hard on the switchgear, on account of the constant "inching" which is necessary when preparing the press, which causes injurious arcing on the contacts of the starting switch, with the result that ordinary starting switches are soon destroyed, and even though renewable contacts may be used, the renewals are so frequently required as to become a nuisance, as well as a very serious expense.

To prevent this injurious arcing all sorts of devices have been employed. The most successful is to use self-acting motor-starting rheostats, in which the motor circuit is always made and broken by means of a solenoid controlled switch which has carbon contacts for circuit breaking, as well as a magnetic blow-out. For small flat-bed presses, however, the initial cost of self-acting motor starters is often considered prohibitive.

With the object of rendering ordinary hand-operated starters suitable, such devices have been employed as carbon auxiliary contacts, magnetic blow-outs, and interlocked solenoid switches, &c. These devices protect only the first step, whereas the minder, whose eyes must be on the machine and not on the starter, pulls the handle, when inching, over to the third or fourth contact, or perhaps further, and in moving it back draws a destructive arc across the starter steps.



IGRANIC MOTOR-STARTER FOR PRINTING MACHINES.

As will be seen by the illustration, the new "Igranic" switch employs an interlocked magnetic circuit maker and breaker; but the essential merit of the arrangement consists in the fact that, no matter how far the operator pulls the handle over in a forward direction, the slightest backward movement instantly opens the circuit-breaker; consequently, no arcing can occur on the starter steps, because they are "dead."

The circuit-breaker has carbon contacts and a magnetic blow-out, and will open the circuit an indefinite number of times without receiving injury. With this starter, therefore, "inching" may be practised to an unlimited extent; in fact, a recent extended trial in a large printing works, under ordinary working conditions, left the contacts as good as new.

In addition, the interlocking of the circuit-breaker with the starter makes it impossible to close the motor circuit except with all the starting resistance in circuit, so that the motor receives proper protection, and the starting switch is claimed to be practically "fool-proof."

Gas-Engine Economy Calculator.

We have received from the KEY ENGINEERING CO., LTD., 4, Queen Victoria Street, E.C., a remarkable device, to which it is not easy to give a simple title. Its nature will be better understood if we first explain its purpose. In their recent paper before the Institution of Electrical Engineers, Messrs. Leonard Andrews and Reginald Porter showed that the question whether steam or gas engines should be used for the generation of power depended largely upon the answer to a further question—whether the saving in fuel consumption effected by using gas engines was sufficient to show a good return upon the additional capital outlay involved. This return will be governed by three considerations: the additional capital involved (under average conditions, from 30s. to 50s. per B.H.P.), the cost of fuel delivered on site, and the average hours per day that the plant is run at full load. The calculator before us is designed to solve this problem in a few seconds—given the data required for the purpose. We find, for instance, that if the extra capital cost per B.H.P. is £3, the cost of coal 6s. per ton, and the average hours of full load per day three, the return on the extra outlay is only 5 per cent.; but if the extra cost is £1, the cost of coal 15s., and the full-load hours eight per day, the return is no less than 100 per cent. Examples are given with the calculator to show its uses; it can, of course, be used to determine any one of the four quantities when the other three are known. One example shows that if interest and depreciation has been fixed at 10 per cent., and if the plant runs at full load 12 hours per day, with coal at 9s. per ton, it is cheaper to use gas engines, even if steam plant can be obtained for nothing. The device is decidedly ingenious and interesting. The principal assumptions upon which it is based appear to be that the cost of repairs, labour, stores, &c., will be approximately the same in either case, and that the fuel consumption of a gas installation will be at least 1 lb. per B.H.P.-hour less than that of the most economical modern steam installation. After that it is plain sailing. Whether these assumptions are wholly valid or not, and whether the considerations mentioned suffice upon which to base a final decision, are questions beyond the scope of this column.

THE JAPANESE MARKET FOR MACHINERY.

THE Japanese firm of Mitsui & Co., which is very largely interested in the import and export trade of Japan, recently established a branch at Hamburg in charge of Herr H. Nölke, an engineer who is well acquainted with the conditions prevailing in Japan, and who has issued a work dealing, among other matters, with that country as a market for German machinery. Herr E. Schiff discusses the work at some length in a recent issue of the *Elektrotechnische Zeitschrift*, and an abstract may be of interest also to English readers. In the first place, Herr Nölke shows how unfavourable to Germany are the trade statistics in relation to the imports of machinery into Japan. The figures quoted by him show that for 1907 the share in the total imports of machinery held by Great Britain was 55 per cent., that of the United States was 31 per cent., and that of Germany was 12 per cent., whilst the German share in locomotives and wagons was particularly insignificant. The author mainly attributes this position of affairs to the fact that England and the United States were the technical instructors of Japan, Germany not having been ripe enough for the purpose at the beginning of the technical development of Japan 35 years ago. As a consequence, the leading positions are mostly occupied by technical men who have been educated in England and the United States; the Japanese engineers speak English, as the doctors and lawyers—and perhaps also the higher officers—speak German. In this way the products of English-speaking competitors have conquered the market, many English and American works directly possessing a monopoly. Another reason for the trade situation disclosed is that German manufacturers do not accommodate themselves to the export conditions. The manufacturer principally limits himself to giving the sole agency for the whole of Japan to a German firm domiciled in that country, without making sufficient inquiry into the conditions. Such firms in this way often become the sole representatives of too large a number of engineering works, and they, moreover, sell, if they can be more successful with them, English and American machinery also. The resulting inconveniences have already unpleasantly surprised the Japanese authorities. These representatives are mostly not experts, but they deal with everything whereby money can be earned; and only two or three employ a German engineer. They are for the greater part located on the coast at Yokohama or Kobe, and know neither the country nor the people thoroughly; they do not get any further than their offices and clubs. Business in Japan, as in China, is conducted with the natives through a native employé, who attends to it in the way established by tradition, but which is wholly insufficient for technical transactions, whilst the experienced Japanese technical men prefer to devote themselves to the juvenile industries of the country. But as technical manufactures are mostly purchased by English-speaking engineers, it is easy to negotiate directly with the Japanese. Nevertheless, a technical representative, in order to be able to form an opinion on the determinative conditions, must know the country and the people, and above all, the language; but very few fulfil these requirements. It is indispensable that representatives should not only be domiciled on the coast but also in the interior, and Tokio and Osaka come into consideration as the two principal industrial cities. A single representative for the whole country is quite insufficient, as 20 hours are occupied in journeying from Kobe to the most important mining district—Kiushiu—and even two days are required to proceed from Yokohama to the coal fields on Hokkaido or to the large copper mines.

The Germans fear, foolishly as Herr Nölke says, the competition of the Japanese in the markets of the world, and in many quarters difficulties are placed in the way of the latter if they wish to visit German industrial works. Such mistrust is, however, wholly unjustified from the standpoint of those who desire to do business with the Japanese, for the purchaser must have an opportunity to see and to make comparisons. The author praises the Siemens-Schuckert works, from a general point of view, as an

exception in reference to their Japanese organisation. Herr Schiff adds, from his own experience of two years ago, that as a result of an inspection of the workshops of the Allgemeine Elektrizität Gesellschaft, Japanese engineers ordered a complete central station on the basis of prepayment, and that the readiness with which the company has always shown its works has been rewarded 100 times over. He also states—and he speaks for many—that he knows what remembrance is cherished of works which refuse to allow an inspection. Herr Nölke then submits material, showing how German works have lacked consideration in their attitude towards prominent Government engineers when paying visits, the result being that large orders have been placed in England and the United States. Such cases naturally become known, and they restrain visits to Germany and cause injury to German industry as a whole. The author proceeds to indicate that the fear of Japanese competition is unjustified, for that country will be compelled for a long time yet to devote its capital mainly to the direct utilisation of its natural resources, and consequently not to technical manufacturing. Notwithstanding the enormous promotion of new undertakings since the war, involving a total of £200,000,000, only three or four machinery works have arisen. Japan will therefore still be dependent upon the imports of such products for a long time; but Japanese competition could not be excluded in perpetuity, and by adopting the methods outlined the Germans are only attending to the business of their rivals.

The author makes various suggestions for the promotion of the export of German machinery. In the first place, the manufacturer should ascertain which of the articles he produces are the most efficient for the market, and calculate that he can only stand the test with them, thus particularly specialising for the export trade. He must also support his representative more strongly than in the markets where his manufactures are already introduced. But, above all, he must dispatch his own engineer to Japan, whilst small works should combine for this purpose, although limiting the number of the works and restricting them to one branch—as, for instance, to the textile department, mining, &c. As to the question of a representative, the manufacturer is advised not to decide before sending out his engineer, but only after the latter's inquiries into the local conditions and persons have been made. At present American and English engineers are to be found in large numbers, and also those from works which are already introduced, but German engineers rarely arrive in Japan. Catalogues must be compiled in the English language with code words, and with the English system of measurement, and containing large patterns; the additions for freight and duty, and the bulk and weight of the packed goods are to be shown. Herr Nölke advises against always making offers to all inquiring intermediaries, as in this way the Japanese import houses and the ultimate purchasers would be crowded with repetitions of the same offers and be overloaded with the work of examination. Still less should the manufacturer comply with the request to grant commission to each export intermediary on obtaining the order, for these firms—even the representatives—as a rule limit themselves by no means to watching over the interests of a single manufacturer. The manufacturer should therefore not let any restriction be placed upon the right to make offers to several import houses.

The conclusion of understandings between competitive German manufacturers is recommended by Herr Nölke, who expects that considerable advantages would be derived from the formation of export syndicates. It also appears to him to be desirable for the German Government to dispatch experts as far as they are technically, commercially and sufficiently experienced in reference to the conditions of the country, and that they should remain there long enough to make themselves personally known in the determinative quarters. In conclusion, the author emphasises the importance for German industry of the Japanese International Exhibition, which it is proposed shall take place in 1912.

LEGAL.

ARMORDUCT MANUFACTURING CO., LTD., *v.* A. FERNHEAD.

IN the City of London Court recently, before his Honour Judge Lumley Smith, K.C., plaintiffs sued defendant, of Caledonian Road, N., for £8 5s. 11d., for electrical goods and fittings supplied. The claim was admitted; but the defendant counterclaimed for £6 13s. 6d., the price of electrical radiators supplied to the plaintiffs. Defendant said that in February, 1908, he saw the plaintiffs' sales manager about the radiators, and he agreed to take them. They were sent as samples on sale or return, but plaintiffs must pay for them now, because they kept them for 10 months and sent them back damaged. Judge Lumley Smith said he supposed if the plaintiffs had returned the radiators in a fortnight the defendant would have taken them back. The defendant thought he might. Dwyer, plaintiffs' traveller, said they were waiting for months for the invoice in respect of the radiators. That was why they kept them so long, as they did not know what they were to be charged. They had never given a specific order for radiators. It was quite a well-known practice in the electrical trade for goods to remain as long as 12 months in shops on approval. The defendant said that was not so as applied to radiators. Had the goods been electroliers he would have been willing to let the plaintiffs have them for nine months and then to take them back. The sale of radiators was a season's trade. Mr. Mahaffy, who appeared for the plaintiffs, said it was very useful for men like the defendant to show their radiators in showrooms such as those of the plaintiffs. Judge Lumley Smith said that when goods were sold on sale or return, the property passed to the buyers if they did not send them back within a reasonable time or give notice that they would not have them. There was a little difference where goods were sent in to be shown. He was satisfied that the goods were sent in to be looked at, to get orders from, and not to be bought or sold. The counterclaim therefore failed. Judgment for the plaintiffs on claim and counterclaim, with costs.

GENERAL ELECTRIC CO., LTD., *v.* BRIDGES.

IN the City of London Court, on Thursday last week, before Mr. Registrar Wild, a claim was made by the General Electric Co., Ltd., against Mr. W. T. Bridges, of Walthamstow, for the sum of £1 8s. 2d.

MR. STROUTS, solicitor, who appeared for the plaintiffs, said the question in dispute was one of trade discount. The defendant was a draper, and had brought certain Osram electric lamps from the plaintiffs, and he claimed to be entitled to a trade discount. The defendant, however, not being an electrician, was not entitled to the discount. It appeared that on previous transactions the discount had been allowed to the defendant in error. Washington, the plaintiffs' ledger clerk, said that the defendant was supplied with electrical goods in November and December last to the amount of £4 14s. 6d. Invoices were sent in for that amount. Off that sum there was a discount allowed to those in the trade. On the occasions when discount had been allowed to the defendant, the plaintiffs were under the impression that he was an electrician. The electric lamps in question, it was presumed, were for his own use. If he was entitled to any discount, he had deducted 33⅓ per cent., but the plaintiffs could only allow 20 per cent. discount upon Osram electric lamps. The defendant said he was perfectly willing to alter the rate of discount which he claimed to be entitled to. For a long period (over several years) he had been trading with the plaintiffs. He had been supplying electrical goods in fairly large quantities to theatres and private consumers. He had had correspondence with the late manager of the plaintiff company's lamp department, and had been negotiating with him regarding further business he was trying to get for the plaintiffs. It was distinctly understood that he had been acting with the plaintiffs' late manager as the agent for the plaintiffs, and working as their agent he did not do that for nothing. The drapery goods business was only part of his trade.

The REGISTRAR said he saw by the correspondence which the defendant had had with the plaintiffs that they had been acknowledging his right to discount; it was rather late now to say he was a draper, and therefore not entitled to it. The plaintiffs' witness said that if the defendant had used the lamps in the way of trade, they were prepared to allow him 20 per cent. Eventually judgment was entered for the plaintiffs for 11s. 2d.

"Z" ELECTRIC LAMP PATENT ACTION.

IN the Chancery Division on Friday, July 23rd, Mr. Justice Warrington heard a summons in an action of the Z Electric Lamp Manufacturing Co., Ltd., against Marples, Leach & Co., Ltd.

MR. COLEFAX, for the plaintiffs, said they asked by their summons that the defendants should be ordered to give further and better particulars of the objections that had been delivered by them to the action, which was a patent action. There was an allegation that the specification of the plaintiffs' invention was misleading, and another that the directions were insufficient. The defendants also said that the invention was not a proper subject matter for letters patent. He wished to know against which of the claims of the plaintiffs was that objection urged.

MR. T. TERRELL, K.C., for the defendants, said there were three claims, and they were all exactly in the same boat. There was no invention. It was the same as if he said there were no eggs in that basket, and then he was asked to give particulars of the eggs that were not there. How could he give particulars of nothing?

After hearing counsel on both sides in regard to certain points, HIS LORDSHIP dismissed the summons with costs, adding that there was really no necessity for it, as the particulars delivered were substantial. He gave the plaintiffs leave to appeal on the ground that particulars in a patent action were of some importance.

NEW SYSTEM PRIVATE TELEPHONE CO., LTD., *v.* SUMMERS.

THIS action came before Lords Justices Vaughan-Williams, Moulton and Buckley on Tuesday last upon an appeal by the plaintiffs from an order of Mr. Justice Coleridge in Chambers, refusing the plaintiffs their costs of a summons for a Receiver to enforce a judgment obtained in respect of a telephonic service.

The action was brought in the Mayor's Court, and judgment was obtained for £22 9s. 7d. That judgment was not satisfied, and finding that the property of the debtor was at 18, Berkeley Street, out of the jurisdiction of the Mayor's Court, the plaintiffs obtained a transfer of proceedings to the High Court, and execution was levied under a writ of *fi. fa.* The Sheriff upheld that the bulk of the goods at Berkeley Street were claimed by a furniture company, and what remained were not sufficient to satisfy the costs of the execution. The plaintiffs thereupon obtained leave to serve

and did serve, the defendant with a summons for the appointment of a Receiver by way of equitable execution. Before that summons was heard, however, the debt was satisfied, and the Judge, confirming an order of the Master, refused the plaintiffs the costs of that summons on the ground that no Receiver was appointed and the summons was unnecessary.

The appeal was argued by Mr. Montague Lush, K.C., and Mr. Newbolt for the plaintiffs; Mr. McCall, K.C., and Mr. Colam, for the defendant, were not called upon.

Their Lordships dismissed the appeal, holding that as the debt was paid before the summons was served on the defendant, the plaintiffs should have taken steps to have it withdrawn. The only costs they could have been entitled to were the costs of issuing the summons; these were in the discretion of the Master, and they could not hold that he had exercised his discretion improperly.

London Electrobus Co., Ltd.

In the Companies' Winding-Up Court, Mr. Justice Neville had before him on Tuesday last a petition by Pritchetts & Gold, Ltd, for the compulsory winding-up of the London Electrobus Co., Ltd. Mr. Manning appeared on behalf of the company, and asked for an adjournment, which was assented to, and his Lordship directed the petition to stand over until next sittings.

Post Office Telephone Agreements.

The Postmaster-General sued Mr. H. J. Benjamin, Elgin Court, Maida Vale, on the 23rd inst., in the City of London Court, to recover £1 8s. 11d. for telephone calls due in excess of the minimum charge.

Mr. McIntyre, on behalf of Sir Robert Hunter, solicitor to the Post Office, said that under the agreement the account of the competent officer was evidence of the calls due. He produced that.

Defendant said he disputed the figures. He thought the calls ought to be proved, and not merely a certified copy put in. The agreement was entered into upon the presumption that a fair and accurate account would be kept. That had not been done.

Judge Lumley Smith said it was to avoid having to prove the calls that the Postmaster-General tied up the public who used the telephone with the conditions. It was impossible to "get round" the agreement.

Judgment for the plaintiff, with costs.—*Financial Times.*

Ward & Goldstone *v.* J. R. Norris & Co.

At Salford County Court on Friday, before Judge Parry, Messrs. Ward & Goldstone, electrical engineers, of Springfield Lane, Salford, sued Messrs. J. R. Norris & Co., electrical engineers, of Oldham, for £2 12s. 6d., the value of telephone cable made to order. It appeared that the order for the cable was given by telephone, but the plaintiffs demanded the payment of an account in respect of a previous order. Defendants thereupon cancelled the order, but in the meantime the cable had been made. For the defendants it was submitted that the plaintiffs could not recover, as they only accepted the order conditionally. When the order was given plaintiffs wrote:—"We thank you for your order for telephone cable, which is receiving our prompt attention, but we shall be unable to send this until we receive your overdue remittance." The Judge said this meant "no overdue remittance, no telephone cable." He found for the defendants.

Companies' Consolidation Act, 1908.

Before the Stipendiary Magistrate at Liverpool on July 21st, arising out of the winding-up order of H. R. Jones, Wilson & Co., Ltd., electrical engineers, Liverpool, Mr. Hugh Rowland Jones, residing at 24, Belgrave Street, Liscard, Cheshire, was summoned by the Deputy Official Receiver (Mr. T. W. J. Brittain) for having failed to comply with Sec. 147 of the Companies' Consolidation Act, 1908, requiring him to submit a statement of the affairs of the company under the winding-up order. Mr. A. T. Miller prosecuted, but defendant was not present, nor was he legally represented when the case opened. After hearing the particulars the Stipendiary inflicted a fine of £10 and 9 guineas costs. At this juncture the defendant entered the Court, and the case being reconsidered, he pleaded that he had done his best. The Magistrate retorted that it was all due to laziness. Eventually the summons was disposed of on the payment of costs, the fine being remitted.

Re Mountain & Gibson.

In the Chancery Court at Manchester, on 27th inst., the matter of the winding-up of Messrs. Mountain & Gibson, Ltd., electrical engineers, of Bury, was mentioned. It came before his Honour Vice-Chancellor Leigh-Clare at Liverpool a fortnight ago, when a question was raised as to whether the winding-up should be compulsory or under supervision. Mr. Kerr now stated that the petition had been amended, and asked for a supervision order, and there was no opposition to it.

Mr. Abbott, on behalf of a number of creditors, applied to the Court to appoint Mr. William Whittaker to act as joint liquidator with Mr. Bowden, with a committee of inspection. These proposals had been approved at a statutory meeting of the creditors.

The Vice-Chancellor made the order.

Consolidated Nickel, Tin and Copper Mines, Ltd, *v.* Crompton & Co., Ltd.

In the King's Bench Divisional Court on Wednesday, before the Lord Chief Justice and Justices Darling and A. T. Lawrence, this action was mentioned, when,

Mr. Abel Thomas, K.C., on behalf of the defendants, asked for a stay of execution.

The judgment of the Official Referee was given in our last issue.

The Learned Counsel said that there were at least five different questions of law upon which the defendants wished to appeal. He was prepared to bring the money into Court at once. This was a case where a stay should be granted, especially when they remembered that the plaintiffs had no money in the bank as far as defendants knew, and no property that they could see, while their registered offices were in Guernsey.

The Court granted the stay and ordered that notice of appeal should be given this week and the money paid into Court. The costs of the application would be costs in the appeal.

BUSINESS NOTES.

Consular Notes.—France.—The British Vice-Consul at Bayonne reports that there are two points of that town which might be joined by an electric tramway; also an electric tramway between Bayonne and Cambo, a growing watering place about 12 miles distant, serving two or three intermediate villages, would probably yield interesting profits, the more so as there is available water power.

The British Vice-Consul at La Rochelle reports that the scheme for the supply of electric light and power to the town and environs is nearing completion, the power station and distributing cables having been completed.

Madeira.—The British Consul at Madeira reports that for the last two years it has been frequently mentioned that a telephone system is to be begun, but although a small amount of money was voted as a commencement, nothing has been done. Telephones are very badly needed, and if properly managed and financed the installation would probably be a success. There are coaling firms, wine houses, banks, sugar and flour mills whose trade is extensive, besides some three or four hotels, and a residential colony of visitors during at least six months of the year, all of whom the Consul thinks might be counted upon as subscribers. It was rumoured at the beginning of 1908 that a British company was to take over the present electric lighting company and erect a new and up-to-date installation, in fact, a member of an electrical firm from the United Kingdom was in Madeira for some time endeavouring to arrange matters, but the scheme seems to have completely fallen through on account of financial difficulties; towards the end of the year the matter was further discussed with a firm in Madeira, but, from all accounts, nothing was done. What electric lighting there is, is bad, and there is certainly much room for improvement.

Liberia.—The British Consul at Monrovia reports that the hinterland of Liberia is known to contain large quantities of rubber, some good, some bad. About 22 different kinds of trees and vines produce rubber of a more or less saleable quality; 16 species of rubber have been classified. Among these species are to be found the *Funtumia africana* and the *Funtumia elastica*. Up to the time of the recent fall in the price of rubber, 4s. to 5s. per lb. had been obtained for the *Funtumia elastica*, and the *Funtumia africana* may realise 1s. 6d. per lb. The price of rubber has lately risen. The collection of rubber seems to be growing increasingly popular amongst the natives of the country. The Liberian Rubber Corporation have obtained certain rights over the collection of rubber in the Republic. One of the principal difficulties in the way of collection of this rubber is the disturbed state of the interior. Until order is brought out of the existing chaos in the hinterland, commercial enterprise in the interior will continue to be jeopardised and interfered with.

Canary Islands.—The British Consul in the Canary Islands reports that it is probable that before long a system of wireless telegraphy will be installed between those islands and Europe, Cape Colony and South America. Santa Cruz de Tenerife is to be the main station in the islands, and communication is to be established (1) with all the adjacent islands, (2) with Cadiz and thence to Paris, (3) with Casablanca and thence to Paris direct, (4) with Pernambuco and thence to Buenos Aires, (5) with a station in Senegambia, probably Dakar, and thence to Cape Town. The work is to be undertaken by a combination of two companies engaged in the promotion of wireless telegraphy, one of them being registered in Paris with a capital of 1,250,000 francs, and the other in Madrid with a capital of 1,000,000 pesetas. A site for the installation in Santa Cruz de Tenerife has been granted by the authorities, and Las Palmas has followed suit, not only with a grant of land, but also with a loan of 20,000 pesetas. The conditions of the loan are that it is to be repaid in 10 years, and the works are to be handed over to the Spanish Government at the end of 20 years. It is said that communication between Tenerife and Cadiz will be established shortly. It is possible that the distance between Tenerife and Pernambuco may be too great for practical success, and in that case an installation will be set up in St. Vincent.

Dissolutions and Liquidations.—CROWN PLATING CO., Salford.—The partnership between J. A. and F. H. Dewhurst, 24, Chapel Street, Salford, has been dissolved by mutual consent, as from July 19th. Debts paid by F. H. Dewhurst.

ELDON ELECTRIC CO., LTD., Newcastle-on-Tyne. (In voluntary liquidation.)—Meeting of creditors on August 5th.

SEYMOUR MOTOR CO., Liverpool.—Messrs. A. C. Whitney and J. H. Sutherland have dissolved partnership; Mr. Sutherland will carry on the business under the same style and at the same address.

ENRIGHT & THOMPSON, London.—Messrs. J. S. Enright and F. Thompson have dissolved partnership. The business will be carried on by Mr. Thompson.

Trade Announcements.—MESSRS. I. FRANKENBURG AND SONS, LTD., of Salford, Manchester, have appointed Messrs. Watson & Whyte, 19, Waterloo Street, Glasgow, as their agents in Scotland for the sale of rubber-insulated and bitumen cables.

We learn that the sole control of sales in the eastern hemisphere of the "Schureman" switchgear has now passed into the hands of the ADAMS MANUFACTURING CO., of Bedford, and 106, New Bond Street, London. The "Schureman" switchgear is entirely of the self-acting type, and includes automatic starting switches and controllers for pumps, lifts, air compressors, hydraulic accumulators, printing presses, and for remote control of motors performing all kinds of duty.

THE GLOBE NAME-PLATE CO., LTD., have removed to more central premises at 20, High Holborn (32-35, Gray's Inn Chambers), W.C., owing to extended business.

MR. JENS ORTEN-BOVING, M.I.M.E., announces that he has taken into partnership Mr. Douglas Spencer and Mr. P. R. Cobb. The style of the firm will henceforth be Jens Orten-Böving & Co. From Monday last, July 26th, the address of the firm is 9½, Union Court, Old Broad Street, London, E.C.

Book Notices.—*A Comedy of Ambition.* By Adam Gowans Whyte. London: Andrew Melrose. Price 6s.—A lady reader would no doubt open this book at the chapter headed "Mrs. Gell's Secret," and having read that, might think she had discovered the author's secret too. In this she would err, for neither the success of the book nor its plot depends upon this secret, although it undoubtedly adds to the piquancy of the story. John Gell, the hero of the book—if we can call him a hero—is an idealist with a super-sensitive conscience. Trained for the church, his faith, originally of a narrow Presbyterian order, is considerably shaken up in Germany, where he goes to finish his theological studies. Forsaking the church, he enters the political world, and suffers many rude awakenings, not only in connection with men but with women also. A considerable portion of the narrative is concerned with the opposition to an Electrical Power Bill promoted by the father of the girl Gell hopes to marry. Gell, being something of a Municipal Socialist, throws himself wholeheartedly into the opposition camp; the reader is let into the secrets of the wirepullers, and obtains many illuminating peeps behind the scenes, learning also a good deal about the conduct of newspaper campaigning. The author has evidently peered deeply into the sea of human emotion, and he describes what he has seen there in language that is always refined, and distinguished by a literary grace which makes it a pleasure to read for its own sake. The interest is well maintained, and it is difficult to put the book down once it is begun.

The Hughes and Baudot Telegraphs. By Arthur Crotch. London: S. Rentell & Co. Price 1s. 6d.—In many respects this is an excellent little work, and one which will be appreciated by telegraphists and others connected with the telegraph administration of this country, as it deals with types of printing telegraphs which, though not by any means in their embryo stage, are increasing in their practical application in this country, at any rate, and are likely to become much more widely used. Though professedly dealing only with the two appliances or systems mentioned, the now defunct Morse multiplex of Delany and others, together with the ingenious duplex multiplex, are, by way of introduction to the Baudot, also briefly touched upon. The descriptions given are, in general, quite accurate and reliable and the illustrations good. As a suggestion, however, it may not be amiss to point out that, in explaining a complex system like the Baudot, a fuller skeleton outline, as a preliminary to details, would considerably assist the reader and render the description easier and more readable. In other words, the subject might be presented more or less as it evolved itself in the mind of the inventor, who must of necessity have conceived the fundamental principles before working out even the simpler details. Though this method has been adopted to some extent in the work, it could be greatly improved in this respect. A brief description of the arrangement of circuits for traffic to which the Baudot lends itself would have formed a useful supplement, had space permitted. The book is a useful one, and can be thoroughly recommended.

Neuere Elektrophysikalische Erscheinungen. By Ernst Ruhmer. Berlin: F. & M. Harrwitz. 1907. Teil I: Fortschritte auf dem Gebiete der Telegrafie und Telephonie.—This work of some 213 pages covers the principal developments in the domain of telegraph and telephone science in recent years. It is well and copiously illustrated with 215 figures. Some of the older automatic and multiplex systems of telegraphy, including the Wheatstone, Delany, &c., are first touched upon, followed by a full and concise description of the Pollak-Virag Morse recording and writing telegraphs, the Murray and Siemens & Halske typewriting systems, &c., with practical information regarding the capabilities and outputs of some of the principal or most successful of these recent telegraph methods. Among numerous others, the telautograph receives notice. Developments in cable telegraphy next claim attention. These are followed by a section dealing with recent telephone appliances and methods, Poulsen's telegraphone, and the Pupin system of loading telephone lines as practically developed by Messrs. Siemens & Halske in Germany. Automatic telephone switching systems are considered, but somewhat curiously the common-battery system is left out. The work collects together in a concise form the cream of recent practice and developments in the telegraphic engineering world. The work will amply pay for perusal by any who are interested in systems of telegraph working, and should serve to convert those who may have formed the impression that telegraphic developments, apart from wireless telegraphy, have reached a period of stagnation. Apart from any question of usefulness or otherwise of many of the recent systems described, the ingenuity and resource displayed in the details of construction are well worthy of study.

Universal Directory of Railway Officials. 1909. London: Directory Publishing Co., Ltd. Price 10s.—This useful directory, which is now in its 15th year, needs little in the way of commendation. It contains particulars of the staffs of practically all the electric tramways in the United Kingdom, as well as of the railways of the world, and includes an official section giving the names of authorities having to do with railway and tramway matters, benevolent societies, &c., in this country. Besides the entries under the railway headings, there is a personal index of railway officials in alphabetical order.

"The Law Affecting Engineers." By W. V. Ball. London: A. Constable & Co., Ltd. 1909. Price 10s. 6d. net.

"Boletim do Ministerio da Industria, Viacao e Obras Publicas," Brazil. Vol. I, No. 1. April, 1909. Rio de Janeiro: Offices of the Directoria da Estatistica.

"Die Transformatoren." By Dr. G. Benischke. Brunswick: Friedr. Vieweg & Son. 1909. Price M. 9.

"Aero Manual." London: Temple Press, Ltd. 1909. Price 1s. 6d. net.

The Land Transport Exhibit at Brussels.—There are good prospects of an effective display being made at the Brussels Exhibition of British exhibits connected with land transport. Models at least will be shown by all the great railway companies, both of engines and of signalling apparatus, foreign lines having something still to learn from British railway engineers. There will also be a strong and, it is hoped, a comprehensive display of British-made motor-cars. These have the highest reputation abroad, especially for their qualities of durability and cheap running; and this being the most important Continental exhibition since that of Paris nine years ago, it is desirable that the headway made by the trade in the interval should be demonstrated clearly. There will, of course, be no such drawbacks at Brussels as Mr. S. F. Edge complained of before the International Exhibitions Committee with reference to that occasion. British cars will be effectively and fairly shown, and will not suffer from the presence of what were known at the Paris Exhibition as "freak exhibits." It is worth remembering, too, that the industrial conditions of Belgium are in many ways so similar to our own that there is a good market for motor-wagons and other heavy vehicles.

Graphite Patent for Disposal.—Particulars are given in our advertisement pages of a patent for the manufacture of graphite, the owners of which desire to sell or lease it.

The "Z" Lamp in Austria-Hungary.—A company has recently been formed, with the title "La Société des Lampes Electriques 'Z' pour l'Autriche-Hongrie," to acquire the Austrian and Hungarian rights in the electric lamps of the Société Internationale des Lampes Electriques Zircone-Wolfram. Works for the manufacture of the lamps have been established at Reverete in the Southern Tyrol, and these are now in operation. The sale of the lamps in Austria and Hungary is in the hands of the Union Impresse Elettriche, of Trente.

Meldrum Destructor.—On July 21st a new refuse destructor installed by the Gainsborough U.D.C. was brought into use. The plant is a two-cell Meldrum destructor of the back-feed type, capable of efficiently destroying 1½ tons of general house refuse per hour, the heat being utilised for raising steam in a Lancashire boiler 30 ft. × 7 ft., working at 150 lb. per sq. in. pressure. It has been erected under the supervision of Mr. S. W. Parker, engineer and surveyor to the Council, by Messrs. Meldrum Bros., Ltd., of Timperley, Manchester.

Bankruptcy Proceedings.—BRIDGEWATER & WRIGHT, York Road, King's Cross, electrical engineers.—At the London Bankruptcy Court on July 21st, a sitting was held for the public examination of Mrs. Charlotte Rix in relation to this failure. The statement of affairs filed under the proceedings showed gross liabilities £878 (unsecured £760), and assets valued at £826, or sufficient to yield a surplus of about £60 after payment of all the debts. Questioned by Mr. W. P. Bowyer, assistant Official Receiver, Mrs. Rix stated that she understood that in January, 1907, her step-brother, Frederick Alexander Wright, purchased the above business for £1,000. He died in the following March, leaving her as sole executrix and universal legatee. In that capacity she carried on the business with a view to its sale as a going concern, but in the beginning of last March the plant, stock and effects were sold, partly under a distress and partly under an execution. Beyond signing cheques, witness had taken no part in the conduct of the business, which was left to the management of Mr. Bridgewater. That gentleman was not a partner, although the trading style was Bridgewater & Wright, he having acted merely as manager for her late step-brother. In all, witness had only received £10 from the business for her personal needs, although the books showed a debit of £303 to her account. Of that sum, £184 was paid to her solicitor, Mr. Cotton, and the balance represented liabilities upon the estate

of the deceased. Witness was utterly unable to explain why the business had proved insolvent. She never saw the books, and throughout relied entirely upon Mr. Bridgewater and her solicitor. She had been living upon rents from house property belonging to her and profits from a boarding house which she had conducted. The business cheques were sent down to her for signature by Mr. Bridgewater. It was in pursuance of her solicitor's advice that she continued the business with a view to its sale as a going concern, and it never struck her that she was embarking upon a dangerous course by so doing. Her late brother was the trustee under the will of Capt. Wright, another half-brother to witness, who left three boys and about £1,400 worth of property. Part of that property was invested in a leasehold house at Chiswick, and on the advice of her solicitor, £300 was raised on the lease and used to keep the business going. The witness was also examined regarding a sum of £340 in which she was jointly interested, and which had also been absorbed in the business. The examination was concluded.

WILLIAM THOMAS HARRIS (trading as W. T. Harris & Sons), electrical engineer, 460 and 464, Commercial Road, and 47, Emanuel Street, Portsmouth, Hants.—This debtor attended at the Court House, St. Thomas Street, Portsmouth, on Monday last, for his public examination before Mr. Registrar Renny. The liabilities were stated to be £3,150 in respect of fully secured creditors, and £55 due to three others in respect of apprenticeship premiums and payable in full, leaving £678 to rank for dividend. The debtor stated that if he could realise his stock and plant at anything approaching their value, he would be quite solvent, and have a surplus. His stock in trade and trade fixtures he valued at £775, but stated that they cost him nearly double that sum quite recently. The book debts were estimated to realise £123. Debtor estimated the realisable value of his assets at £899, which, if attained, would leave him a balance of £166. Replying to the Official Receiver, debtor said he started business in 1899, and was in receipt of a pension of £42 12s. He had a capital of £700. He had never been in difficulties with his trade creditors, nor had he been pressed by any of them. During the whole course of his trading he had never had any proceedings taken against him for the payment of money. Debtor attributed his position to a loss he sustained in the taking of a garage in Emanuel Street. A trading account for the past year shows the gross profits to have been £916 13s., but the trade expenses had amounted to £907 4s., leaving a net profit of only £9 9s., which, added to his pension, amounted to £52, against bad debts £80 18s., and housekeeping expenses £104. The stock in trade, plant, machinery, &c., were of the value of £960, but, if separated, it would probably not realise more than £550. The examination was closed. Messrs. E. Whittaker and C. Watts have been appointed trustees.

LANCELOT WALTER DE GRAVE (trading at L. W. de Grave and as Degrave & Co. and as Squire & Co.), 19, Queen Street, Derby, electrical engineer, &c. This debtor appears to have been in business for about 10 years, having commenced with a free capital of £100, and he attributes his present position to lack of capital and bad trade. The accounts filed show unsecured liabilities £271 12s. 6d., and net assets £162 19s. 1d., or a deficiency of £108 13s. 5d.

C. SCOTT SNELL, civil and electrical engineer, 25, Victoria Street, S.W., filed his petition on July 19th, and a receiving order was made. The first meeting will be held on August 9th; public examination, September 7th.

G. SUTCLIFFE (trading as G. Sutcliffe & Co.), Abertillery.—A first and final dividend of 3s. 1d. in the £ has been declared, payable on July 28th last.

Tantalum Lamps.—MESSRS. SIEMENS BROS., Tyssen Street, Dalston, inform us that they are placing on the market the new high-voltage "Tantalum" lamp for direct current, which, as mentioned in our last issue, will give 25 C.P. at an efficiency of 1·7 watts for all voltages between 200 and 240. The general appearance of the lamp is similar to that of the 32-C.P. high-voltage "Tantalum" lamp. Messrs. Siemens Bros. are issuing a new leaflet (14 B) dealing exclusively with this lamp, and will be pleased to supply it to electrical contractors. They also inform us that, owing to the exceptionally large demand, they have been compelled to obtain a fresh supply of their "Satisfied Consumer" adhesive labels, which are becoming known to the trade as "sticky-backs," and are supplied free of charge to the electrical contractor; they are suitable for attaching to correspondence, packages, &c., providing him with a means of keeping "Tantalum" lamps before his clients.

Catalogues and Lists.—MESSRS. L. ANDREW & Co., 2, Carr Street, Blackfriars, Manchester.—Wholesale price list of insulating materials for electrical purposes—ebonite, fibre, press-spahn, mica, &c.

MESSRS. VICTORIA DYNAMO AND MOTOR Co., Craven House, Kingsway, W.C.—Leaflet relating to A.C. motors, two and three-phase, 50 cycles, type D, in sizes from ½ to 85 H.P.; while particulars are given of 33 different combinations of speed and output, with the efficiency, power factor, &c., for both slip-ring and squirrel-cage types, the shipping weights, &c., are given in a short and handy list of 18 items. Starting devices are also listed. A separate leaflet gives particulars and prices of a series of electric pulley blocks, for hand or electric travelling, or suspension from a crane hook, controlled from the floor level.

MESSRS. COOKSON & Co., Albion House, 59 and 61, New Oxford Street, W.C.—Leaflets relating to their patent electromagnetic sorting machines, of which a new pattern has been designed taking only 100 watts for excitation, "Cookson" storage batteries, plates and accessories, and motor-car lamps.

MESSRS. ERNEST F. MOY, LTD., Greenland Place, Camden Town, N.W.—Price list No. 17 of D.C. moving-coil instruments, round dial and sector, horizontal and vertical edgewise, portable, and combined ammeter and voltmeter patterns, as well as separate shunts, &c. The shunts are of an alloy which does not form a thermo-couple with the terminal blocks, so that false readings are avoided.

THE EDISON & SWAN UNITED ELECTRIC LIGHT Co., LTD., Ediswan Buildings, Queen Street, E.C.—Leaflet No. S. 2,157, giving particulars and prices of their latest patterns of fittings for ships, mills, collieries, &c., and all-porcelain fittings for chemical works and similar places.

MR. C. SCHNIEWINDT, Neuenrade, Westphalia.—Leaflet relating to "thorn" dowels—an ingenious type of metal dowel, in which the insulator and the dowel are both locked in place with a single nail; various patterns of tapped dowels with screws, rosettes, cleats, &c., for surface wiring are listed.

MESSRS. J. H. HOLMES & Co., Portland Road, Newcastle-on-Tyne.—List No. 107 just issued, containing illustrations of a number of interesting electrical plants installed by the firm for engineering works, shipyards, railways, and dockyards. One half of the publication is occupied with tabulated details of such plant, supplied to a large number of customers in these classes.

PHŒNIX DYNAMO MANUFACTURING Co., LTD., Thornbury Works, Bradford.—Forty-page well-illustrated publication wherein are given some notes about the company and a brief description of the works, followed by a selection of half-tone views of P.D.M. plant installed in large central stations, and electrical equipments for lighting and power in factories, for pumping, mining, engineering, wood-working, textile and other purposes.

MR. D. C. BATE, 40, Brazennose Street, Manchester.—Leaflet describing the Blake microtector antiseptic telephone cap, for which Mr. Bate is sole agent for Lancs., Yorks., and Cheshire.

THE WESTINGHOUSE BRAKE Co., LTD., 82, York Road, King's Cross, N.—Card describing the Westinghouse silent rocker-joint chain drive (Morse patents), ½ to 500 H.P.

MR. HAYDN T. HARRISON, 11, Victoria Street, S.W.—Catalogue of street lighting apparatus and accessories, including a number of fittings specially suitable for lighting with tungsten lamps, up to 1,000 C.P., and for converting gas lanterns to electric. Some useful tables and data are included.

Annual Holidays.—MESSRS. A. SEAGE & Co., London, W.—Works and offices will be closed from noon Saturday, July 31st, until Monday, August 9th, 1909.

MESSRS. EVERETT, EDGCUMBE & Co., LTD., Collindale Works, Hendon, N.W.—Works and offices will be closed from Saturday, July 31st, until Monday, August 9th. A small staff will attend to urgent correspondence.

MESSRS. MIRRLEES BICKERTON & DAY, LTD., Hazel Grove.—Works and offices will be closed from noon Saturday, August 7th, until Monday morning, August 16th. A small staff will be in attendance to deal with urgent correspondence.

MESSRS. NEWTONS, LTD, Taunton.—Works and offices will be closed from July 31st to August 4th inclusive.

THE CRYPTO ELECTRICAL Co., London, S.E.—Works and offices will be closed from 12 30 o'clock Saturday, July 31st, until Monday morning, August 9th. A portion of the staff will be at the offices to deal with urgent correspondence.

Cowper-Coles Exhibits at the White City.—A new company has been formed, entitled "The Cowper-Coles Engineering Co., Ltd.," with a working capital of £40,000, and offices at 82, Victoria Street, S.W. It is a private company, formed to develop the business of Sherard Cowper-Coles & Co., Ltd., and no issue will be made to the public. The company has a large exhibit of its special products and apparatus at the White City. The now well-known sherardising or "regenerative" process forms a leading feature; the merits of this system of coating steel and iron with zinc are becoming widely appreciated. The direct production of copper sheets, tubes and wire by the Cowper-Coles centrifugal electrolytic process is also well represented, and Mr. Cowper-Coles's metallic parabolic mirrors for searchlights, coated with alternate bands of gold and silver, are shown; it is claimed for these that the gold mirror gives a remarkable power of penetration, while its combination with silver gives a beam of exceptionally dazzling effect for military purposes. Numerous other exhibits of electro-deposited metals are shown, including iron, as well as a welding machine for aluminium wires, patent ventilators, and the "caloriser," a device for ensuring the complete combustion of smoke in steam boilers, for which high qualities are claimed.

Sales.—MESSRS. BENJAFIELD & WOOD will shortly sell by auction, at Lincoln, an electrical engineer's manufacturing plant and stock. MESSRS. FULLER, HORSEY, SONS & CASSELL offer for sale a modern electric power plant. Particulars are given in our advertisement pages to-day.

LIGHTING and POWER NOTES.

Beckenham.—The Council had before it this week a proposal to improve the gas lighting of Shortlands district with inverted burners at a cost of £3 7s. 6d. per lamp of 120-C.P. The proposal has been adjourned in order that the Electricity Committee may consider and report whether it can provide equally efficient lighting with metallic-filament lamps at lower cost.

Bury (Lancs.).—The T.C. has applied to the B. of T. for permission to utilise overhead lines for the transmission of energy to the Bolholt Bleachworks.

Buxton.—The U.D.C. has applied to the L.G.B. for a loan of £500 for mains and services.

Cape Colony.—On July 1st the Cape Town Corporation electricity department took over the responsibility of supplying energy in bulk to the Cape Government Railways, and the Table Bay Harbour Board. The supply to the Cape Town Post Office is also taken from the Corporation through the Railway switchboard. Cables have been laid in duplicate by the Corporation, both to the Railway and Docks switchboards, in order to provide against a breakdown. For the purpose of the extensions a large quantity of new plant has been installed, the whole of the additional machinery being of British manufacture. The engines are by Belliss & Morcom, and are directly coupled to Siemens alterators generating two-phase current at 2,200 volts. The engines are capable of giving a continuous output of 600 B.H.P., with an overload of 25 per cent. for two hours. The boilers were supplied by Babcock & Wilcox, and the condensing plant by W. H. Allen, of Bedford. There is also a booster (by the Phœnix Co., Bradford), for raising the pressure from 440 volts to 550 volts for working purposes at the Docks. A battery station has been erected at the Docks, and equipped by the Chloride Co. The switchboard was supplied by Siemens Bros., and is of the remote control pattern. In addition to the two steam-driven alternators, there is a motor-generator so that when the lighting load at the Railway and Docks is small, the load can be supplied from the alternator of this motor-generator; this plant was supplied by the General Electric Co., of London. The old battery station at Dorp Street has been dismantled, and a new battery shed erected and equipped, adjoining the Central Electric Light Works. The total cost of the extensions amounts to about £25,000.

Castleford.—The U.D.C. has decided to object to the application of the Electrical Distribution of Yorkshire, Ltd., for a year's extension of the electricity prov. order, which expires on August 2nd, "by reason of the neglect of the present holders, and that other and better arrangements might now be possible." The Wakefield and District Light Railway Co. having intimated that it was in a position to supply electricity at short notice, the Council has asked the company to submit details and a scheme.

Continental Notes.—NORWAY.—The municipality of the town of Kragerö, has resolved to erect a municipal power station, from which the town is to be supplied with energy for electric lighting. The power required, about 700 H.P, will be supplied from the generating station of the Norwegian Electrical Co., at Valafos, about 11 miles from the town, and will be transmitted through the carbide factory belonging to the firm and situated in the town. The price stipulated in the contract, per horse-power per annum, is 50 kroner (£2 15s.). It is proposed to raise a loan of 150,000 kr. (£83,500) for the cost of the work. The municipality of Harstad, in the North of Norway, has adopted a similar course; power will be obtained from a waterfall at Gausvik, about 17 miles from the town, belonging to a manufacturing company, from which the town has secured up to 1,000 H.P.

Regarding the supply to Bergen, of electric power, the Municipal Board has decided in favour of plans which have been worked out by a committee with the view to harnessing the falls of the Samnanger River. The work is to be started at once, and a sum of one million kroner (£55,555) has been voted for commencing the work by harnessing the first fall, which is estimated to yield 7,000 H.P at a total cost of 2½ million kroner (nearly £140,000).

PORTUGAL.—The new central electric lighting station on the Tagus, of Compagnie Reunies Gaz et Electricite, of Lisbon, is now practically completed, and will shortly be inaugurated. The plant comprises 10 Belleville boilers, a 1,500-KW. Parsons steam turbine and Brown-Boveri alternator, a similar set of 1,750 KW., and two smaller sets of 750 KW. capacity each. The old Boa Vista power station, which has a capacity of 1,060 KW., will in future be used as a transformer station, for converting the alternating current from the Tagus station to continuous current. The capacity of the two plants is about 9,000 H.P. The company last year supplied current to the extent of 4,048,000 units, an increase of 836,000 units over the preceding 12 months. The mains now extend over 240 km., a supply being given not only to the whole of Lisbon, but along the coast as far as Mont Estoril, a distance of 25 km.

GERMANY.—A central station is to be established at Rudolstadt for the electric lighting, not only of that town, but also the neighbouring one of Saalfeld. The Siemens-Schuckert Co. and A.E.G. are interested in the undertaking.

Cuba.—It is announced on the authority of the Belgian Legation at Havana that private people have obtained concessions for electrical supply undertakings at Colon and Cienfuegos; in neither case has municipal sanction been obtained.

Derby.—A L.G.B. inquiry was held last week into the application of the T.C. for a loan of £7,300 for electrical purposes, made up of £5,000 for mains, £500 for services, £900 for motors, £100 for radiators, £500 for transformers and chambers, and £300 for pipe lines, these amounts being for one year's requirements only, and the greater part being in connection with the supply of power. There was no opposition.

Edinburgh.—The last year's surplus on the electric light undertaking amounted to £2,071. It was proposed, at a meeting of the Corporation Electric Lighting Committee, that this sum be applied towards the redemption of the capital debt on the undertaking, but another motion to apply it towards the relief of the rates was carried. The charge for lighting is to remain unaltered.

Fleetwood.—Messrs. Broadstone, Ltd., of London, have informed the U.D.C. that they intend applying for a prov. order for electric lighting.

Gillingham (Kent).—A special meeting of the T.C. was held on July 23rd to consider the appointment of an expert to investigate the E.L. undertaking. A list of 12 experts was submitted, but the question of an appointment was deferred to give the L.G.B. an opportunity of considering the report of the borough electrical engineer, Mr. Chalmers, which the Board had not seen when it arrived at its recent decision with regard to the loan of £5,000.

Greenock.—The burgh electrical engineer has prepared an interesting report on extensions necessary at the power station, in view of the applications for current by the Admiralty for the new torpedo factory and by Messrs. Scotts' shipbuilding and engineering company. The latter firm having secured the contract for the building of one of the new Dreadnoughts, is making considerable additions to its power-using plant, and is prepared to enter into an arrangement with the T.C. to purchase the whole of the energy required for the purposes of its business under certain conditions, the first being that the rate for the first 500,000 units per annum should be 1d. per unit, for the next 500,000 units, nine-tenths of a penny, and for all in excess of one million units per annum, eight-tenths of a penny. The engineer reports favourably on the proposal, and deals with proposed extensions to the generating plant to meet the increased supply to Scotts' works and the Admiralty factory. He estimates the cost of this extension at about £10,000, which sum does not include the cost of the cable to the torpedo factory or Messrs. Scotts, which he places at £2,150 to the former and £420 to the latter, making a total for the whole extension of £12,482. It is understood that the offer of the British Westinghouse Co. has been conditionally accepted for providing the whole of the engine room plant for the extension at a cost of £4,300.

Llandudno.—The experiments conducted by the Lighting Committee as to the relative advantages of electricity and incandescent gas for lighting the Promenade, terminated last week, when the Council, on the recommendation of the Committee, decided to adhere to electricity for the present.

London.—FULHAM.—The borough E.L. engineer having reported favourably on the changing-over of the Town Hall installation from carbon to metal-filament lamps, has been authorised to carry out the work at a cost of £208. The present cost of lighting is £417 per annum, and the estimated cost, after the change-over, is £184.

The Electricity Committee having tried metal-filament lamps for lighting Fulham Palace Road, in lieu of the present arc lighting, recommends that the whole of the lighting in that road, also in High Street, Fulham, should be converted at an estimated cost of £507.

STEPNEY.—The B.C. is to enter into an agreement with the Poplar B.C. for a minimum supply of 500,000 units by September 30th, by a continuous 250-KW. load, at a price of 3d. per unit for energy supplied untransformed at the Limehouse sub-station. The supply is required during the transfer of certain plant from the Osborn Street station to the new building at Blyth's Wharf.

POPLAR.—The fifth annual report of Mr. Horace Bowden on the work of the electric supply department for the past year shows a net revenue of £37,810 and a gross profit of £18,342; after meeting loan charges amounting to £14,662, and allowing for certain minor additions and deductions, the net surplus was £3,218. During the year 5,845,692 units were sold, including 1,083,523 units for private lighting; 3,972,099 for power and 789,690 units for public lighting. The average prices received were: private lighting, 3·337d.; power, 1·057d., and public lighting 1·5d. per unit; and the total works costs amounted to ·799d. per unit, with a load-factor of 23·83 per cent. and a maximum load of 2,800 KW.

New South Wales.—The Newtown Municipal Council has had under consideration the question of electric lighting, Major Cardew having reported on the matter.

The Moree Municipal Council has applied for permission to borrow £3,900 for public and private electric lighting work.

The last portion of the Sydney City Council's electric lighting plant has recently been converted from single to three-phase by Messrs. Noyes Bros., Ltd.

New Zealand.—The Wellington Municipal Electricity Department earned some £44,321 last year, and after meeting financial charges, &c., there was a surplus of £4,272.

Northampton.—The Markets and Town Hall Committee has recommended the T.C. not to proceed with the scheme for generating electricity for lighting the Town Hall and offices, on account of the expense, which is estimated at £2,134, exclusive of the provision of a building for the plant. With a view of reducing the present cost of lighting, 4½d. per unit with an annual consumption of from 16,000 to 17,000 units, metallic-filament lamps are to be experimented with as renewals are required.

Penzance.—The B. of T. has informed the T.C. that it is intended to revoke the E.L. order granted to a company in 1904, and the Council has decided to take no action in the matter.

Preston.—The T.C. has been recommended not to purchase the undertaking of the National Electric Supply Co., Ltd.

St. Ives.—Messrs. Foote & Milne have informed the T.C. that they intend applying to the B. of T. for a prov. order for E.L.

Sheffield.—On July 21st a L.G.B. inquiry was held relative to the application of the T.C. for a loan of £56,000 for electricity purposes. There was no opposition. It was mentioned that the T.C. was seeking to extend the mains to Tinsley with the consent of the Yorkshire Electric Power Co., in whose area the district is.

Stoke-on-Trent.—The L.G.B. has declined at the present time to sanction a loan to the T.C. of £650 for the installation of a water-cooling plant at the electricity works.

Stourbridge.—The Midland Electric Corporation for Power Distribution, Ltd., is about to commence the laying of mains in the town, and it is anticipated that a supply of energy will be available by October. For private lighting the price will be 4d. per unit, less ½d. per unit for prompt payment of accounts; and for shops, public houses, and other places where there will be long-hour lighting, the discount will be 1½d. per unit.

Sutton (Surrey).—In regard to the recent proposed increase of charge for current by the South Metropolitan Electric Lighting and Tramways Co., the Town Clerk has been instructed to write to the company, that it appeared to the Council that the Board of Trade could be approached with reference to the reasonableness of the charges for current, but that before considering this it was suggested that a friendly conference with the company upon the matter, at which the views of the various interested parties could be given, might be advisable.

Swanage.—Messrs. Foote & Milne, Ltd., have given the U.D.C. notice that they intend applying for a prov. order for electric light.

Transvaal.—The Nylstroom municipal authorities are arranging to install electric lighting. The directors of the City Deep, Ltd., have offered a handsome bonus to the Victoria Falls and Transvaal Power Co., Ltd., to supply power this month, *i.e.*, three months ahead of the specified time.

A special report of the Select Committee on the Transvaal Electrical Energy Private Bill, recommending that the proceedings of the Council on the Bill be suspended, and resumed in the following session, has been adopted by the Legislative Council.

Uxbridge.—The Board of Guardians at its last meeting considered matters in relation to the lighting of the workhouse. The chairman (Mr. Stilwel) said the medical officer had reported in favour of electric lighting. He (the speaker) was of opinion that gas was the cheaper, but that electricity would be the better both as regards the purity of the atmosphere and the cost of keeping the establishment clean. Mr. Houlder pointed out that up to the present they had received no estimates as to the cost of the suggested alterations in the lighting. Mr. De Salis said that the electric lighting company charged 5d. per unit, and he suggested that the Guardians could generate electricity at a very much cheaper rate. He moved "That subject to the cost being hereafter approved, it is desirable that a system of electric lighting should be installed, the light to be generated by a plant owned by the Guardians." Mr. Bailey pointed out that gas was supplied to the workhouse at 3s. 3d., which, considering that the price in London was 3s., was very fair. The company had even promised a reduction on the 3s. 3d. Mr. De Salis's proposal was rejected by 7 votes to 4, and a committee was appointed to go into the whole question and report to the Board.

Walthamstow.—The electrical engineer has prepared a report with regard to the proposed extension to Highams Park. He estimates the total cost at £6,828 made up as follows:—Converting plant at works and transformer sub-station, £2,060; high-tension cable and spare conduits, £2,554; distributing cables, £2,214. The last mentioned amount would cover the laying of distributing cables in 13 roads. He did not think the revenue to be derived during the first two or three years would meet the loan repayments and interest on the outlay, but ultimately as the district developed, there appeared to be no reason why it should not be financially successful. The Electricity Committee has decided in favour of adjourning the consideration of the matter for two months, and has also adjourned the consideration of the conversion of the whole of the street gas lamps, excluding those in Highams Park, to electric light. In regard to the last-mentioned scheme the electrical engineer is to submit a detailed report to each member of the Council. A special meeting of the Committee is afterwards to be held to go into the matter.

West Ham.—The report of Mr. A. H. Seabrook on the working of this undertaking to March 31st last shows a credit balance of £3,854 on the year's working, an improvement over the previous year of £8,522, which is attributed to the increased power business. The revenue from lighting actually decreased from £23,996 in 1907-8, to £22,784, due to well-known causes, but there was an increase in power revenue of nearly £8,200. The output for the year amounted to 15,522,065 units, as compared with 11,299,783 units in the previous year. The former amount includes 1,928,528 units for lighting, 785,157 for public lighting; 8,190,453 for power and heating; and 4,617,927 units for traction. As regards the output for power, this shows an increase of practically 100 per cent., the motors connected increasing from 445, of 6,224 H.P., to 833, of 8,683 H.P. The maximum demand on the station was 6,100 KW., and the load factor 29·1. The total revenue amounted to £67,202, and the gross profit to £33,365, or 7·78 per cent. on the capital. The total works costs fell from ·72d. per unit in 1908 to ·52d. per unit in the past year; while the average price during the past year for all classes of supply amounted to 1·02d. per unit, and for individual supplies was as follows: Private lighting, 2·72d.; public lighting, 1·53d.; power, ·591d.; and traction, ·997d. per unit.

TRAMWAY and RAILWAY NOTES.

Continental Notes.—NORWAY.—In Drammen, at the Christianiafiord, a company has recently been formed for the purpose of building a new electric rail-less tramway. Nearly the whole of the share capital, which is fixed at about £8,000, has been subscribed for, and the work will be commenced in the near future.

HUNGARY.—An electric generating station is about to be established in the town of Czinkota for the supply of the current required for the local electric tramway.

AUSTRIA.—A public service of electrical motor vehicles on the Mercedes-Electrique-Stoll system has just been inaugurated between Liesung and Kalksburg, a distance of about 2 miles. The cars take the necessary current from overhead conductors.

GERMANY.—A project has been brought forward in Germany for the construction of a suspended electric railway between the island of Nordeney and Norddeich, which is the present starting point for steamers to this island in the North Sea. By this means the sea journey by ship would be avoided, and a connection established which would permit of the passage from the terminal railway station on this part of the Continent to the well-known seaside resort being accomplished in the course of a few minutes. The length of the proposed railway would be about 6·2 miles, and the line would be carried on concrete columns arranged on the sand-banks of the shallows. It is intended to provide a double track and a 10 minutes' passenger service of trains in operation only during the day, whilst the line would be exclusively used for the transport of goods in the night. The estimated expenditure on the construction of the railway, which would be furnished with power from the Wiesmoor electricity works, shortly to be opened, is put at £100,000. It is assumed that the Government would financially participate in the undertaking, as its execution would render a large outlay on harbour and railway works at Norddeich quite unnecessary.

TURKEY IN ASIA.—A third line of electric tramways has just been completed and put in operation in the town of Bayreuth.

FRANCE.—The first section of the electric funicular railway from Le Fayet to the summit of Mont Blanc was opened to the public on July 25th; the section reaches to Col de Voza, 5,495 ft. altitude, covering some 7½ km., with grades of 1 in 5 to 1 in 12. The line is constructed in the open, and work is to be commenced shortly on the next section, 8 km. long, to Tete Rousse, 10,300 ft. high.

Devonport.—In April last the Corporation issued summonses against the Devonport and District Tramways Co. for failing to run a service which had been prescribed by the Corporation upon the tramways in the borough leased by the Corporation to the company, and also for failing to run certain workmen's cars on such lines. Before the summonses were heard, the company applied *ex parte* to the Divisional Court for a rule of prohibition to prevent the magistrates from hearing the summonses. The Corporation, on the 14th and 15th ult., showed cause against the rule being made absolute, when the Divisional Court gave judgment in favour of the Corporation, and discharged the rule with costs. The company gave notice of appeal from this decision. We understand that the notice of appeal has now been formally withdrawn by the company, and that the summonses will come on for hearing before the Devonport magistrates.

East London Railway.—The directors' report for the half-year to April 30th last, touches on the question of electrical working, as usual. It is pointed out that as the Brighton Co.'s Victoria-London Bridge line is not yet working, no data as to the comparative cost of working the overhead and third-rail systems are yet available, and therefore the directors are unable to make any suggestion as to electrification at present.

Ilford.—For the first year since the tramways were laid down in 1903, the working (during the past twelve months) has resulted in a loss. This was due to the motor-'bus competition, owing to which an increased service of cars was run on the High Road and Ilford Lane route. There was an increase of expenditure of £1,020 caused solely by this increased service, while, on the other hand, there was a decrease on receipts of £526. These two figures had turned the net profit of £1,401 in 1908 into a net loss in 1909 of £1,431. For the three months ending June there had been an increase in the revenue of £600, there being also a decrease in car-mileage and current consumed.

Keynsham.—The Bath Electric Tramways Co. has applied to the B. of T. for an extension of three years for the construction of the tramways to Keynsham.

Liverpool.—The City Council has received for consideration a recommendation from the Tramways and Electricity Committee that a supplementary estimate for £11,112 be approved for the doubling of the tramway lines, &c., in Netherfield Road.

Liverpool-Southport Railway.—Through the breakdown of a H.T. cable at the Formby generating station of the Lancashire and Yorkshire Railway, traffic on the electrified section of the railway between Liverpool and Southport was disorganised for some time on Thursday morning. The supply of current between Formby (which is near to Southport) and Liverpool was cut off, but the railway staff made temporary arrangements for the conveyance of passengers by using steam engines, and in the course of the day the cable was repaired, traffic being resumed on Friday morning.

New South Wales.—The Sydney suburban authorities have been invited to join a movement with a view to persuading the Government to consider the advisability of electrifying the whole of the suburban railways.

The Railway Commissioners have now decided to electrify the Newcastle tramways.

Portsmouth.—The Tramway Committee has found that the result of the year's working is a profit balance of £2,297, which has been arrived at after every charge on the undertaking has been liquidated, allowing for interest and sinking fund and putting aside the usual amount of £10,900 for maintenance and £2,500 for insurance. The Finance Sub-Committee is to consider the question of the disposal of the balance, which may be applied to the relief of the rates.

The Mayor of Portsmouth (Councillor J. Baggs) acted as tramway motorman on Tuesday last week, when he drove the gaily-bedecked car containing the members of the Corporation over the extension of the tramways from Fratton Bridge to Milton. Afterwards his Worship drove the whole of the way from the Milton terminus to the Town Hall, where the party adjourned to the Banqueting Room and were entertained by the Mayor to lunch. This extension has been finished, and is now working, before the provisional order authorising its construction has been granted, and there has been a saving on the estimated cost of over £3,000. The total cost of the work was £11,341 16s. 4d., and the estimate was £14,407. The saving was in the cost of materials.

Tasmania.—The Launceston City Council, having failed to come to an arrangement with the London syndicate for the construction of the tramways, is taking a poll of the citizens, with a view to obtaining sanction for itself to construct and work the lines.

Transvaal.—An electric railway between Johannesburg and Pretoria is being advocated locally.

West Australia.—A loan of £30,000 is to be obtained to extend the Fremantle Municipal electric tramways.

West Bromwich.—The Highways Committee of the Corporation has issued a report dealing with certain matters in dispute between itself and the South Staffordshire (Lessee) Co. regarding the working of the tramways in the borough. The Committee claims that, by an agreement which the Town Council entered into with the company in December, 1905, and in consideration of a number of concessions, including the substitution of another system for the Quin cut-out system, the running of a less frequent service, and also of smaller cars, the company covenanted to take from the Corporation a minimum supply of electrical energy of 900,000 units per annum instead of a minimum of 300,000 units per annum at the prices fixed by the lease, this minimum to be continued during the term of the lease. The company had ever since that time had the benefit of the concession made by the Council, but they had refused to execute the agreement on the ground that it was not part of the arrangement that they were to pay for a minimum supply of electrical energy equal to 900,000 units per annum at the prices fixed by the original lease during the remainder of the term of the lease. The Committee states that it has no hesitation in declaring that the increase of the minimum supply was an important factor in persuading it to grant the concessions asked for by the company. The Committee, having received this definite refusal on the part of the company to complete, has instructed the town clerk to write to the tramways company requiring the agreement as settled by him with the South Staffordshire Tramways (Lessee) Co. to be sealed within 14 days, or in default, to take proceedings to compel them to comply with the terms of the original lease.

TELEGRAPH and TELEPHONE NOTES.

Australia.—It is probable that the Eastern Extension and China Telegraph Co. will soon pick up their cables between Low Head, Tasmania, and Flinders, Victoria, thus leaving the telegraphic business in the hands of the Commonwealth Administration.

Brazil.—A new radio-telegraphic installation has been erected on the Morro da Babylonia, Rio de Janeiro, on the Telefunken system. The station is 250 metres above the sea-level, and has a radius of 200 km.

Cheaper Cables.—The British, Indian and Australasian Governments having agreed to bear their rateable share of the reduction, the tariffs for Press telegrams exchanged between Great Britain and the under-mentioned countries, *via* Eastern or *via* Indo, will, from the 1st prox., be reduced as follows:—India and Burma, to 9d. per word; Ceylon, to 9½d. per word; Australia, Tasmania and New Zealand, to 9d. per word. The rates to South Africa have also been reduced by about 3d. a word.

France.—In appointing M. Millerand as Minister of Public Works, the new Government has placed him in direct personal control of the Department of Posts and Telegraphs, which was previously headed by an Under-Secretary of State, M. Simyan being the last to hold that appointment. M. Millerand states that his first aim will be to reorganise the telephone service, and to promote the adoption of a measure determining the exact status of State employés, particularly of civil servants.

Telegraphic Interruptions:—

Tangier-Cadiz	May 19, 1909
Assab-Perim	July 8, 1909

Wireless Telegraphy.—Referring to the decision of the Government that it was desirable that, at any rate, the principal wireless stations for communication with ships should be not in private hands, but in the hands of the Government, Mr. Buxton recently remarked that no licences for such stations had been given or promised for more than three years from the present time, and therefore in any case the Government would be able to take the service into its own hands. "But I think it would be desirable," he added, "to anticipate that date and take over the stations at once if it is found possible, as I hope it may be, to make an arrangement for that purpose which will be acceptable to the Marconi Co. and other interests concerned."—*Daily Telegraph.*

Referring to the negotiations mentioned by Mr. Buxton, having for their object the acquisition of the Marconi wireless stations round the coast, the deputy-manager of Marconi's Wireless Telegraph Co. pointed out to the Press Association that the licences were originally granted for eight years, and as the company had "provided a thoroughly efficient public service during the past five years," and was still in a position to do so, it was hardly reasonable to suppose that Mr. Buxton, three years hence, would desire to give effect to his suggestion, which would practically amount to confiscation of the company's property. Mr. Marconi stated that the offer made by the Post Office was so inadequate that the directors of the Marconi Co. decided that it could not be accepted.

The arrangements hitherto in force for the transmission of radio-telegrams to his Majesty's ships through coast stations have been discontinued, and the Post Office will no longer accept such telegrams.

CONTRACTS OPEN and CLOSED.

OPEN.

Australia. — MELBOURNE. — August 4th. Overhead travelling crane for the Council. See "Official Notices" June 11th.

Ten 100-number switchboards for the Postmaster-General's department in New South Wales. See "Official Notices" July 16th.

NEW SOUTH WALES.—Telephone material for the P.M.G. See "Official Notices" July 23rd.

Ballinasloe. — September 10th. The Committee of Management of the Ballinasloe District Lunatic Asylum wants tenders for the supply and erection of overhead cables. See "Official Notices" to-day.

Canada.—WINNIPEG.—August 2nd and 16th. The city of Winnipeg is advertising for tenders for the hydraulic and electric equipment of the generating station now under construction on the Winnipeg River, at Thirty-foot Falls. Some particulars were given in this column on July 2nd.

Cleckheaton.—The U.D.C. wants tenders for the purchase of two battery regulating switches. See "Official Notices" to-day.

France.—PARIS.—August 18th. The Under-Secretary for Posts and Telegraphs, 103, Rue de Grenelle, Paris, requires tenders for 75 stamping machines worked by electric motors.

August 11th.—The Direction de la Manufacture d'Armes at Châtellerault (Vienne) requires tenders for cables, copper wire, and dynamo construction material (11 lots).

August 5th. The Under-Secretary for Posts and Telegraphs, 103, Rue de Grenelle, Paris, requires tenders for telegraph apparatus and accessories; also by August 3rd for a number of tools required to repair telephone and telegraph installations and apparatus.

Germany.—August 4th. The gas, water and electricity authorities in Dresden are inviting tenders for the supply and erection of two 700-KW. dynamos.

COLOGNE.—August 25th. The Municipal Council requires tenders for four electrically-driven cranes.

The Stadtisches Maschinenbauamt, Cologne, is inviting tenders until August 25th for the supply of four electrically-operated cranes.

Italy. — August 10th. The Italian State Railway authorities in Rome are inviting tenders from foreign as well as from home makers for the supply of 100,000 metres of telegraph cable.

August 18th.—The Italian State Railway authorities in Rome are inviting tenders for the supply of six electrically-operated drop hammers.

Keighley.—August 7th. Two 1,000-KW. turbo-alternators with condensers, and two water-tube boilers for the electricity department. See "Official Notices" July 16th.

London.—G.P.O.—August 9th. Creosoting telegraph poles for the P.M.G. Mr. G. Morgan, Controller of Stores, 17-19, Bedford Street, W.C.

Russia.—September 13th. The municipal authorities of Bachmouth (Government of Ekaterinoslav) are inviting tenders for the concession for the public electric lighting of the town.

Salford.—August 9th. The Corporation wants tenders for the purchase of a steam dynamo of 120 KW. See "Official Notices" to-day.

Spain.—August 26th. Sixty years' electric tramway concession (between Monachil and the suburbs of Gabia Grande, Granada province). Tenders, with £130 deposit, to Direccion General de Obras Publicas, Madrid.

August 27th.—Tenders are invited by the Direccion General de Obras Publicas, at Madrid, for the taking over of a concession for the building and working of a system of electric tramways in Barcelona. A deposit of 40,596 pesetas must accompany the tender.

Turkey.—The Ministry of Marine, in Constantinople, invites tenders for the supply of electrical apparatus for the Imperial fleet. Inquiries should be addressed to the Conseil de la Marine, Constantinople.—*B. of T. Journal.*

York.—August 27th. The Corporation wants tenders for 18 double-deck electric tramcars and a watering car. See "Official Notices" to-day.

CLOSED.

Bedford.—The Electricity Works, Cauldwell Road, Bedford, have placed an order with Messrs. Ed. Bennis & Co., Ltd., Little Hulton, Bolton, for one pair of "Bennis" 1909-model high-duty coking stokers and self-cleaning compressed-air furnaces for an 8-ft. Lancashire boiler.

Belgium.—Four concerns submitted tenders for the extension of the electric lighting undertaking in the town of Tongres, the lowest being that of the Compagnie Belge Siemens-Schuckert, of Brussels.

Birmingham.—The District Drainage Board has accepted the tender of Messrs. Crompton & Co. for a motor and pump for the Saltley pumping station, at £877; and that of the General Electric Co., Witton, for similar plant at the Minworth station, at £423 10s.

Cape Colony.—*African Engineering* states that Henley's (S.A.) Telegraph Works have received an order for some cables in connection with the lighting of Green and Sea Points, Cape Colony. Messrs. W. T. Glover & Co., of Manchester, are supplying the overhead wires for the same lighting.

Dudley.—The Springsmire Electricity Works have placed an order with Messrs. Ed. Bennis & Co., Ltd., Bolton, for one pair of "Bennis" stokers and compressed-air furnaces for a Babcock boiler.

Greenock.—The Corporation has placed a contract for one 1,000-KW. turbo-alternator, one 750-KW. alternator, high-tension switchboards, and two 450-KW. rotary converters and sub-station switchboard with the British Westinghouse Electric and Manufacturing Co., Ltd.

Ilford.—The Education Committee has accepted the tender of Mr. Edgar Porter, of 221, High Road, Ilford, for the electric light installation at the new schools at Goodmayes, at £333 8s.

Llandudno.—The Tramways Co., for which Messrs. Stephen Sellon & Partners are consulting engineers, has awarded a contract for seven Warner trucks (non-parallel axle), with 10-ft. wheel base, to Messrs. Mountain & Gibson, Ltd., of Bury, Lancashire.

London.—The L.C.C. has accepted the tender of Messrs. Hurst, Nelson & Co., Ltd., for the supply of a special truck, fitted with two sets of mechanical brakes, &c., for use on steep gradients, at £247, with £40 for extra work if required.

Contracts have been placed with Messrs. G. Hayward & Co., Ltd., for the supply of 10 travelling platforms for painting cars at the Holloway car-shed, and 41 movable platforms for cleaning cars at Norwood car-shed; with the British Westinghouse Co. for repairs to that company's motor-generators at an estimated cost of £2,163; with Messrs. Cammell, Laird & Co., Ltd., for steel tires at £2,473 15s.; and with Messrs. Hurst, Nelson & Co., Ltd., for 260 destination indicator boxes for cars, at £799 10s.

STEPNEY.—For the supply of cable required at the Blyth's Wharf station, the Electricity Committee recommends the acceptance of the tenders of (*a*) W. Geipel & Co. for 30 yd. 0·3 sq. in. paper-insulated cable, at £30 5s. 7d., and 110 yd. 0·05 sq. in. rubber-covered and fireproofed cable, at £20 6s.; (*b*) Baxter & Caunter, 300 yd. 1·0 sq. in. rubber-covered and fireproofed cable, at £270.

FULHAM.—The B.C. has placed an order through the architect, with Messrs. Higgins & Griffiths, at £57 10s., for special electric light fittings for the new central library. The order for the plain electric light fittings is to be placed by the electrical engineer at an estimated cost of £142 10s., so that the Council may get the benefit of the discount.

Northampton.—The T.C. has accepted the tender of the Premier Accumulator Co. for 12 new sections for the battery in connection with the tramways, at £33 18s. per section.

Rotherham.—The T.C. has accepted the tender of Halley's Engineering Co. for a motor tower wagon for the tramways, at £685.

Rugby.—The U.D.C. of Rugby (per Messrs. Tinkers, Ltd., Hyde) has placed an order with Messrs. Ed. Bennis & Co., Ltd., Bolton, for one "Bennis" coking stoker for a Cornish boiler.

Southport.—The Education Committee has accepted the tender of Messrs. R. A. Ault & Sons, of Talbot Street, Southport, for electric bells for the schools, at £35.

NOTES.

City and Guilds of London Institute.—The report of the Council for the past year contains a brief account of the relations between the Institute on the one hand, and the University of London and the Imperial College on the other, as well as of the two latter to one another, a matter which is now under the consideration of a Royal Commission. Representations have been made to the University regarding the holding of a Degree Examination in Engineering common to all classes of students, regardless of the character of the courses of instruction they have undergone, a circumstance which reacts unfavourably upon the curriculum of the Central Technical College, and tends to produce uniformity of teaching, to the detriment of specialisation and originality. To correct this, the Board of Studies has recommended that special examinations of the students of the Central Technical College shall be held by the University examiners, in association with the Professors of the College and with direct reference to the courses given.

The Council refers with regret to the death of Prof. Ayrton, who was appointed on the staff of the Institute in 1879, and led the way in the development of technical training in electrical engineering. Mr. T. Mather, F.R.S., was appointed acting-professor in his stead.

The transfer of the first-year instruction in Physics and Chemistry to the Royal College of Science has set free space in the Central Technical College for engineering work, and has enabled special courses of post-graduate work in Railway Engineering to be organised, special series of lectures being given in these courses by Mr. H. S. Brown and Mr. Philip Dawson.

The number of students attending the Central Technical College in the session 1907-8 was 438, compared with 407 in the preceding year; of these, 113 followed the course in Electrical Engineering, as compared with 126 in the previous year, and 222 took Civil and Mechanical Engineering. At the end of the session, 91 students received the Diploma of Associate, and of these some 14 continued their studies at the C.T.C. Mr. R. E. Neale gained the Siemens Memorial Medal and Premium in Electrical Engineering. Twenty-three students obtained the degree of B.Sc. (Engineering), in the University of London.

The equipment of the engineering department of the Technical College, Finsbury, has proceeded during the year; the electrical department has been re-arranged and the equipment extended. Of a total of 186 day students attending the College, 76 followed the Electrical Engineering Course; 298 evening students attended complete or special courses.

As the result of the session 1908-9, the Council has awarded the Diploma of Associate to 98 matriculated third-year students of the Central Technical College who have completed a full course of instruction as prescribed by the Council—65 in civil and mechanical engineering, 28 in electrical engineering, and five in chemistry. The Siemens Memorial Medal and Premium has been awarded to Mr. F. H. Bramwell. Certificates have been awarded to 20 matriculated third-year students who have completed a full course of instruction at the Central Technical College and to 59 students who have completed a full course of instruction at the Technical College, Finsbury.

English Craftsmanship.—The Council of the Association of Teachers in Technical Institutions, acting on behalf of members of the Association who are teachers of artistic trades and crafts, has passed a series of resolutions embodying reforms which the latter consider urgently needed in the interests of English craftsmanship. The following main divisions have received attention: The standard of work; the relative amount of hand and machine work in each craft; the conditions of apprenticeship and the existing means of training apprentices; the work of existing evening trade classes; and the need or otherwise for day trade schools.

The Association holds that, if the standard of English craftsmanship is to be maintained, it is imperative that boys should be

trained in the principles and practice of the crafts. At present this type of training is non-existent. The London Artistic Trade and Craft Teachers therefore strongly urge that national and local education authorities should provide this training; and that the establishment of day trade schools is the only satisfactory method of accomplishing this work.

Apprenticeship in London in the artistic trades and crafts has almost ceased to exist, and where it does exist, there is no guarantee that boys will be properly taught the trade at which they are working. For reasons of economy, masters generally train a "one-process" boy, and such training is held to satisfy their legal obligations.

The training of boys under the present industrial conditions would be better carried on in day trade schools than in shops. The trade schools would discover the boy's natural bent, and by directing it and giving the boy a definite purpose in life, would prevent wastage. Time spent in the schools should count as part of apprenticeship, or be accepted in place of apprenticeship, the boy going into the craft as an "improver."

Every parent should have the opportunity of providing a training at a day trade school for his children, should he desire it.

It is strongly urged that all teachers in trade schools should have had workshop experience; that the want of academic or technical certificates should not be a bar to the appointment of a good teacher; and that heads of trade schools and heads of departments should be men of reputation in some trade or profession other than the teaching profession.

The Section also strongly urges the desirability of appointing advisory committees (where such are not in existence) to each trade school, such committees to include representatives of employers and craftsmen.

Evening trade classes have done, and are doing, valuable work, though often at the sacrifice of necessary recreation and sometimes of health. The Section therefore urges the establishment of earlier evening classes for the younger boys, pending the establishment on a large scale of day courses of instruction. At these evening classes there should be adequate provision in the way of scholarships and free places.

The Retort Courteous.—A metropolitan technical journal recently received from a country firm the following note:—

"Dear Sirs,—This day we have placed an order for an advertisement with your Mr. Smart, thanks to his consummate impudence. Where on earth did you pick him up?"

As Mr. Smart had only just commenced his duties, and all his predecessors had canvassed the firm in vain, his employers were naturally desirous of questioning him on this charge of "consummate impudence."

"Well," said the young traveller, "you advised me to adapt myself to circumstances, and to meet probable customers with their own weapons. In this instance the manager apparently ignored me for several minutes, and then he roared out: 'Now, young fellow, what blood-sucking firm do you represent?' I handed him your business card, and replied: 'These bleary-eyed vampires!' and it seemed to tickle him immensely."

The S.P. Surface-Contact System.—At the works of the J.L. Manufacturing Co., Ltd., Southall, a demonstration was given on Saturday, the 17th inst., of the new surface-contact system known as the "S.P." or "Simplex." The patents for this system were taken out by a Russian named Mr. D. Suchostawer, and are owned by the S.P. Syndicate, Ltd., who have made a working arrangement with the J.L. Manufacturing Co., Ltd., for the hire of their tramcar and experimental track, with a supply of current at 500 volts. The J.L. Manufacturing Co., Ltd., did all the necessary constructional work of fitting this up on the S.P. system. The demonstration was entirely successful, the car being driven round the track, and stopping, starting and reversing with ease. The lights and indicating apparatus on the car showed that a constant and steady current was collected from the studs, and no live studs remained on the passing of the car, a feature of safety which the syndicate claim as peculiar to their system.

The principal features of the system consist of the magnet carried on the car—extending for nearly its whole length—with a flexible iron-wire skate, and studs provided with mechanism of a new design. The iron stud has a central brass stem, round which there is an iron plunger, which is attracted upwards towards the top of the stud when the magnetised skate makes contact with the latter. Two brass arms carrying at their outer ends carbon contact blocks are connected to the plunger, and when this is attracted, the blocks are brought into contact with either side of a lug screwed on the live wire. Flexible conductors carry the current from the carbon ends to the brass stem of the stud. The studs are set about 6 ft. apart, and the skate is nearly twice this length, so that there is no interruption to the collection of the current. The iron frame of the stud-box helps to complete the magnetic circuit through the outer poles of the magnet, and thus increases the force with which the plunger is attracted. It is claimed that it is almost impossible for the mechanism to make and to maintain contact with the live wire after the car has passed; but a pilot brush is provided behind the skate, connected with an alarm bell, to give warning if a stud should remain alive. The construction of the box, which has a movable frame resting in a fixed frame with a close-fitting machined joint, is such that the movable part can be taken out with ease. The depth of the box is but little more than that of the rails. The live wire is laid in an earthenware trough, filled up solid with bitumen except at the boxes. In reports on the working of the tramway at Southall, Mr. H. M. Sayers and Mr. H. C. Furniss speak very highly of the behaviour of the system and of its simplicity.

The German Lamp Taxes.—The proposed taxes on gas and electric lamps have now passed through all their stages, and will come into operation on October 1st; the annual yield to the State Treasury is expected to amount to £1,000,000. It has been left to the Federal Council to determine the manner in which the taxes are to be levied, although regulations on the subject have yet to be issued. It is possible to levy the import in two ways; either by the use of a banderole or paper strip placed round the articles, or by means of the so-called book tax. If the Federal Council were to adopt the former method, which is considered to be scarcely worthy of assumption, an army of inland revenue officials would be necessary to exercise control, as there are from 40,000 to 50,000 dealers in the country. As to the application of the tax in general, it is understood that the lamp makers will charge the tax to the merchants, who in turn will make consumers pay it. It has yet to be settled whether the Government will compel manufacturers to pay the tax in advance or whether the latter will be granted a respite. The difference between the two systems is of importance, in so far as prepayment would involve makers in a loss of interest. The introduction of the tax at the beginning of October will result in an increase in prices to the public. Carbon-filament lamps up to 15 watts will then be sold at 1s. 9·6d. each, as compared with 1s. 9d. at present; metallic-filament lamps up to 15 watts, which have hitherto been available at 2s. each, will be 2s. 1·2d., and incandescent gas mantles will be sold at 4·2d., as against 3d. at present.

Electrical Fatalities.—An inquest was held on Monday at Manchester on the body of John Davies (35), of Peel Street, Pendleton, an employé at the Manchester Corporation Electricity Works, Stuart Street. On the 22nd inst. one of the engineers told deceased to remove two transformers from one end of the spark-gap gallery to the other, and deceased came into contact with a live stud.

Mr. H. Lamb, acting resident engineer at the works, explained that the transformers were used for the purpose of reducing from high pressure to low pressure. At the time of the accident there were about 3,750 volts on the spark-gap. Davies had taken one transformer to its place and was returning for the other. Around the spark-gap there was a guard in the form of a rail. Deceased had gone inside the rail instead of keeping outside.

John Wall, labourer, said they had got one transformer in position and were on the point of fixing the second. The transformer was between him and the deceased, whom he saw suddenly lift up his hands above his head and fall unconscious to the ground. In answer to the Coroner, witness said he thought Davies had gone inside the rail because it was easier, though witness did not see that there was any necessity to do so.

The sub-station attendant said he was on a gallery above, when he saw deceased walking along inside the rail. He was going to warn him, but had not time before the flash occurred, when he saw deceased roll over.

Dr. Telford said death was due to suffocation, that being the ordinary kind of death when high electric currents passed through the body.

Mr. Pearce (chief of the electricity department) was asked by Mr. Gibson if there was any more modern system existing than the one of the Manchester Corporation. Mr. Pearce replied that he did not know of any or that there was any more recent design. As a matter of fact, the design at the works in Stuart Street was the "last say" in the matter of spark-gaps. There was only one small spot on the stud unprotected. The Coroner: But what about a glass screen round the stud? Would that not be a safeguard?—If you had these studs covered up, you would be introducing new dangers. Glass is altogether out of place in connection with high-tension apparatus, and if a man wants to make a thorough investigation of them, he is in considerable danger in taking the covering away, for the sparks must be seen.

The Coroner pointed out to the jury that, as the deceased had worked there for nearly four years, he ought to have known better than to go inside the rail.

Mr. Brocklehurst expressed sympathy with the deceased's relatives, and said that anything the Corporation could do to relieve their burden in the way of compensation would be done.

A verdict of "Suffocation due to electric shock" was returned.

An inquest was held on the 23rd inst. at Ystradgynlais, touching the death of David Davies (24), who was killed on the previous day at Ynisceedwyn Colliery.

Mr. R A. Gower, electrician, said that on examination of the spot immediately after the accident occurred, he found a broken cable, evidently the result of a fall of stones.

The jury returned a verdict of "Accidental death from electrical shock."

A New Aluminium Combination.—The first practical step in connection with the proposed revival of the international aluminium syndicate has been taken, by the arrival at a complete agreement of the representatives of the French producers at a conference held in Paris on July 19th. It is now intended to approach the Aluminium Industry Co., of Neuhausen, with the object of coming to a fresh understanding which, if concluded, will probably foreshadow the re-establishment of the syndicate. The Paris conference was the second of the kind. The announcement of the first conference has already led to considerable dealings, on the one hand, in the shares of the Swiss company at Zurich, which advanced by 10 per cent. in the four days ending with July 16th, whilst a further result is afforded by a report from Mannheim to the effect that the German merchants have just raised the price of aluminium by from 4s. to 5s. per cwt., up to 64s. per cwt. It is not known for the moment whether the

French companies have yet made any advance in the price of the metal, but it is understood that the demand has grown in recent months, whereas a sudden decline took place in 1907 and continued during 1908, although it has to be borne in mind that the productive capacity of various countries has been largely increased in the past two years. The stocks of two French companies are reported to have been cleared, and apparent confirmation of the expansion in requirements is shown by the circumstance that the exports of aluminium from France in the first five months of this year amounted to 617 tons, as compared with only 126 tons in the equivalent period in 1908.

The Eight Hours' Day.—An evening contemporary states that after an extended trial the eight-hours' day, which Mr. Arthur Chamberlain established in connection with Kynochs (Limited), has been discontinued, the company being handicapped in competition with rivals.

Institution and Lecture Notes.—American Institute of Electrical Engineers.—The twenty-sixth annual convention was held at Frontenac, N.Y., on June 28th to July 1st, and according to the *Electrical World*, was one of the most pleasant recorded. The total attendance numbered 252. President L. A. Ferguson opened the convention and delivered his presidential address, after which the President-elect, Mr. L. B. Stillwell, was installed in the chair. He stated that the Institute numbered about 600 members, and 6,000 associates. Emphasising the importance of electrical engineers taking part in public affairs, he declared that a broader training in the "English branches" was essential; intellectual mechanics could be had in any number for small salaries, but the demand of the time was for men who were capable of doing real engineering work, and presenting the facts in a clear and comprehensive manner. A large number of valuable and interesting papers were read and discussed.

Institution of Municipal Engineers.—The first annual general meeting of the Institution will be held at Durham on Saturday next week; the members will be received at the Town Hall by the Mayor, and after the presentation of the annual report of the Council, Mr. Horace Boot's paper on "The Design and Requirements of Electric Power Works," which was presented at the general meeting on April 24th last, will be discussed. Other papers will follow, and at the conclusion of the meeting the result of the ballot for election of the Council for the year 1909-10 will be announced.

On the 17th inst. about 30 members of the Rochdale and District Motive Power Mutual Improvement Society visited the works of Messrs. Ed. Bennis & Co., Ltd., Little Hulton, Bolton. They were conducted through the shops by Mr. A. W. Bennis and shown the different branches of coal and labour-saving apparatus in their various stages of manufacture.

North-East Coast Institution of Engineers and Shipbuilders.—The address of the Institution has been changed to Bolbec Hall, Westgate Road, Newcastle-upon-Tyne.

Institution of Mechanical Engineers.—This year's summer meeting of the Institution, covering four consecutive days, opened at Liverpool on Tuesday at the Municipal Central Technical School, under the presidency of Mr. John A. F. Aspinall (president), of Manchester, and in the papers which were submitted, the application of electricity to engineering was not neglected. The papers prepared were:—"Locomotives Designed and Built at Horwich," by Mr. Geo. Hughes, of Horwich; "Advance of Marine Engineering in the Early Twentieth Century," by Mr. Arthur Maginnis, of Liverpool; "Reinforced Concrete," by Mr. Arthur G. Anden, of Liverpool; "Indicating of Gas Engines," by Prof. F. W. Burstall, of the Birmingham University; and "The Electrical Operation of Textile Factories," by Mr. Herbert W. Wilson, of Liverpool. It had been announced that Mr. Alaric Hope, of Liverpool, would contribute a paper on "Hydraulic and Electrical Appliances on the Liverpool Dock Estate," but the subject was not included in the final programme. The local arrangements have been in the capable hands of Mr. Thos. L. Miller, M.I.E.E.

In a lengthy review Mr. Arthur J. Maginnis, M.Inst.C.E., expressed the opinion that there would soon be an extensive application of electric power direct to the propeller shafts. Among the advantages likely to accrue from the adoption of direct electrical shaft drive, it was mentioned that reversal of the propeller with full effective power is readily effected, and that the design of plant, steam and electric, can be so modified as to enable the naval architect to make better and more profitable arrangements for passenger and cargo space. Owing to the fact that lower boiler-pressure can be used by the steam turbine generator, it was anticipated that the weights of the steam and electric plants together would not exceed that of the present system of reciprocating machinery, and that the first cost would average about the same. Of the advantages of this system, one which would commend itself to the navigating department, was the possibility of obtaining the long-looked-for apparatus to control the movements of the propellers direct from the bridge. Another advantage lay in the fact that electricity, like steam, was capable of being readily applied to all the other requirements of shipboard—steering, windlass and winchwork—combined with the further advantages of more economical distribution, and giving a simple and agreeable artificial light throughout the vessel. Anticipating the contention that if turbine machinery had been the great success claimed for it, it was not necessary to add further complications by introducing the electrical drive, he replied that it was not proposed to use electric drive on fast vessels (naval or mercantile), but to apply it to the slower-going cargo tramps. Should this system of main electric drive come about, it might safely be said that a new era of electric navigation was about to dawn, and one promising great results. For instance, the continued decrease in the boiler pressure as commenced with the steam turbine, would no doubt be further continued, and even lower pressures could be made use of, which would largely decrease the weight of boiler installations, and so cheapen the first cost. Through the fact of the greater portion of the machinery being electrical rather than mechanical, the heavy weights of such moving parts as pistons, piston and connecting rods, slide valves, link motion, eccentrics, &c., would be done away with, and so render the outfit and overhauling of the electric boat (propelled by electricity generated on board by steam) more simple and more easily effected than on the steam-propelled craft at present in use.

Lancashire and Cheshire Municipal Tramway Managers.—The quarterly meeting was held at the Town Hall, Birkenhead, on July 16th. The Mayor and the chairman of the Tramways Committee received the members, and after the ordinary business had been completed the members were conducted over the car depôt, workshops and generating station by the chairman of the Tramways Committee and Mr. W. Wyld, the general manager and engineer of the tramways. The members, with the chairman and members of the Tramways and Electricity Committees, afterwards partook of tea at the invitation of the Mayor (Mr. Councillor McGaul). It was decided to accept the invitation of Mr. T. J. Kendrew, the general manager of the Southport Corporation tramways, to hold the next meeting at Southport, on October 15th next.

Pour Rire.—The young son of a well-known London electrical contractor was at school one day last week, and his teacher was trying to explain to him the meaning of the word "recuperate."

"Johnny," she said, "when night comes your father returns home tired and worn out, doesn't he?"

"Yes, ma'am," assented Johnny.

"Then," continued the teacher, "after four or five days of hard work, and being more or less run down, he spends the week-end out of town. What does he do?"

"That," replied Johnny meditatively, "is just what Ma wants to know!"

The British Association at Winnipeg.—The provisional programme of the proceedings of the Engineering Section, which commence on August 25th, is as follows:—

Address by the President, Sir W. H. White, K.C.B., F.R.S.
Second Report of the Committee on Gaseous Explosions.
"The Work of the British Association Committee on Gaseous Explosions," by Dugald Clerk, F.R.S.
"The National Trans-Continental Railway," by Duncan MacPherson.
"International Electrical Standardisation," by Ormond Higman.
"Improvements in the Navigation of the St. Lawrence," by Lieut.-Col. William P. Anderson.
"The Behaviour of Ductile Material under Torsional Strain," by C. E. Larrard.
"Hydroplanes, or Skimmers," by Sir John Thornycroft.
"Great Engineering Works on the Canadian Pacific Railway," by J. E. Schwitzer.
"The Distribution of Dielectric Stress in Three-phase Cables," by W. M. Thornton and O. J. Williams.
"The Engineering Works of the Panama Canal," by Col. Goethals.
"Losses from High-Tension Overhead Lines due to Brush Discharge," by E. A. Watson.
"On the Calculation of the Charging Currents in Three-Core Cables and Overhead Transmission Lines Supplied with Three-Phase Currents," by E. W. Marchant.

Mr. W. A. Price is the secretary of this Section.

Preservation of Wooden Poles.—At the annual convention of the Association of Railway Telegraph Superintendents at Detroit last month, a paper on the "Preservation of Poles" was presented by Mr. H. P. Folsom. According to the *Electrical World*, the paper opened with a discussion on the cause of decay of poles at the ground line. The conclusion was that it is the result of a fungus growth, and that the germ attacks the pole from the outside. The paper was largely devoted to a description of a patented method for arresting the decay of poles, and full details were given as to its application. Briefly, a hole about 14 in. deep is dug about the pole, a layer of Portland cement is placed at the bottom of the hole, and the surface of the pole is cleaned to a point somewhat above the level of the ground. Next a jacket made from a sheet composed of asbestos and asphaltum is placed about the pole, leaving an annular space about 2 in. deep, which is filled with a germicide in a dry state mixed with sand. The germicide consists of slacked lime, common salt and a small quantity of sulphate of copper. Around the top of the jacket a cap or collar of Portland cement is formed, this being reinforced, if desired, with old telegraph or telephone wire. This collar protects the chemicals and jacket from the action of the rain and snow, and also protects the pole against grass fires. It is stated that the chemicals are slowly dissolved by the natural moisture in the pole, and pass into the same by the action of capillary attraction, thus destroying the fungi and wood-eating insects. A gang of three men can treat from 20 to 30 25-ft. poles per day at a cost of about 75 cents to $1 per pole, including royalty. Very large poles costing from $50 to $75 have been treated at a cost ranging from $1.50 to $2.50. It is stated that poles thus treated when they were partially decayed have, after nine years, shown no increase of decay, and that the protecting device is still in good condition.

(*Continued on page* 183.)

THE WORKS OF THE G. WEYMOUTH PROPRIETARY CO., LTD., MELBOURNE.

By J. H. DAVIES.

These works are situated at Richmond, about three miles from the city of Melbourne proper.

The company's history dates back about ten years, when it was founded by Mr. G. Weymouth, who is still its managing director, and is a native-born Australian, who obtained his early training with the Austral Otis Engineering Co., of Melbourne, and was subsequently for some years in the service of Messrs. Siemens and Messrs. Johnson and Phillips, in England.

Since the time of its foundation the firm's business has continuously progressed, and it is now the most important electrical manufacturing business in Australia. A very wide range of work is carried out, including direct-current and polyphase generators and motors, transformers and switchgear of every description. The company does not, however, limit itself to electrical work only, but engages also in the manufacture of water turbines, centrifrugal pumps, small steam engines and engineering work of a general character.

Figs. 1, 2, 3 and 4 are various views of the works at Richmond. To prevent any misconception, it should be explained that the smoke-stack visible in the view of the exterior of the works is accounted for by the fact that the building was previously the generating station of the A.U. Alcock Co., one of the early companies, whose business was absorbed by the Electric Lighting and Traction Co. of Australia, now called the Melbourne Electric Supply Co.

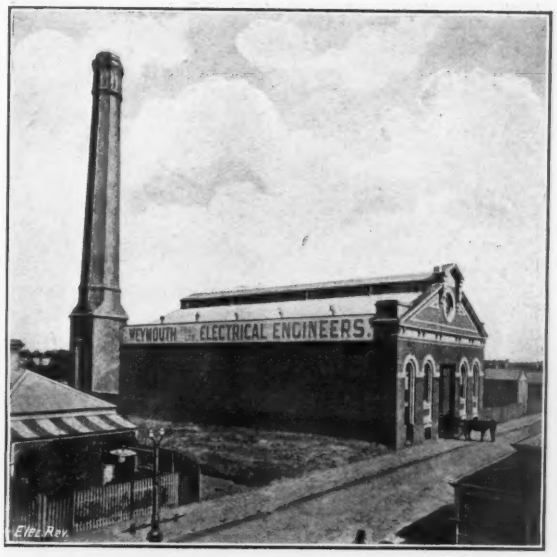
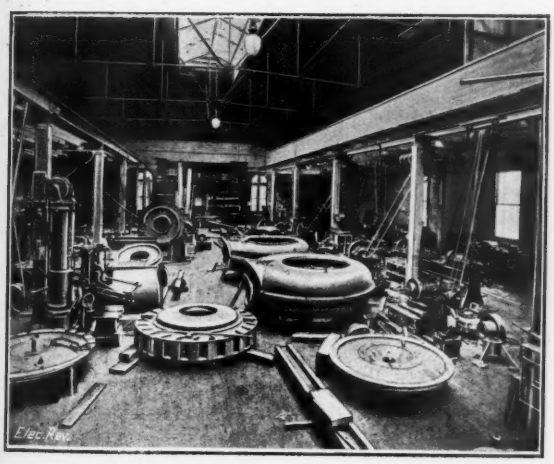
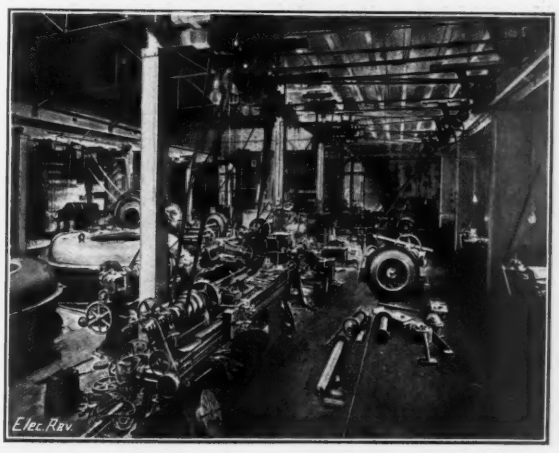


Fig. 1.—The Works of the Weymouth Proprietary Co., Melbourne.





Figs. 2 and 3.—Interior of the Weymouth Works.

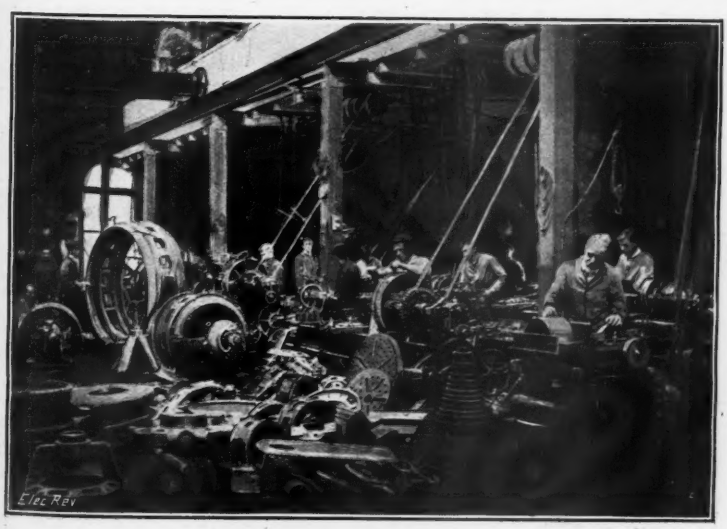


Fig. 4.—Machine Shop, Weymouth Works.

The shops are driven throughout by 440-v. 50-cycle single-phase induction motors, driving on to short countershafts for groups of small machines, and to individual machines in the case of larger ones. Energy is taken from the mains of the Melbourne Electric Supply Co.

The illustrations of the interior of the shops show some examples of the work which is handled in them. The switchboard and winding departments are situated one on each of the two galleries which extend the entire length of the building (one on either side of it), and immediately above the small machine shops. All the winding of small machines and former-coil winding is thus done in a situation where there is no risk of damage to the insulation from flying pieces of metal.

The combined unit, fig. 6, is typical of the D.C. sets supplied by the company, this being a 60-KW. engine and generator; fig. 6 also illustrates the company's polyphase motors up to 200 KW. attached to winding and hoisting

FIG. 5.—ELECTRICAL MINING LOCO., AS SUPPLIED TO THE AUSTRALIAN MINES.

apparatus and to a treble ram mining pump, with a capacity of 6,000 gallons per hour, against a 1,000-ft. head. The company also build high-lift turbine pumps, and, indeed, quite a speciality is made of electrical machinery and equipment for mines, such work including complete power plants, winding engines, locomotives for underground hauling, ventilating and pumping plants.

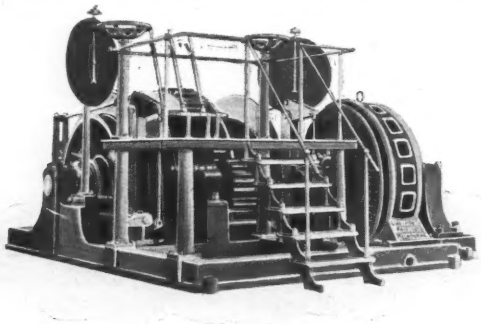
A typical winding plant is illustrated in fig. 6; this is driven by a 200-H.P. three-phase motor, and has a lifting capacity of 7,000 lb. at a speed of 500 ft. per min.

Fig. 5 is a view of an underground train of trucks used for the carriage of wash-dirt from the workings to the mine shaft. The electric locomotive is one of the Weymouth Co.'s standard 10-H.P. direct-current type, of which a large number have been supplied to various mines in the Commonwealth. The locomotive is built to go into a standard mining-cage 5 ft. × 2 ft.; it weighs 32 cwt., and will haul 60 trucks of wash-dirt at 5 to 6 miles per hour.

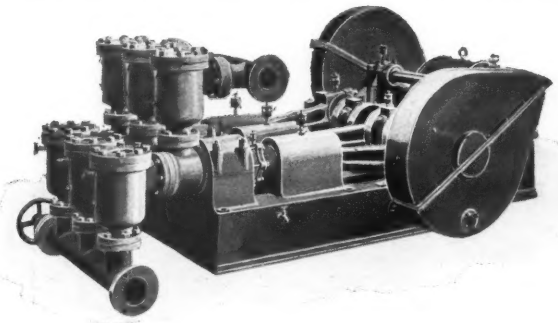
Among the electrical contracts passing through the shops at the time of our visit were:—

A 120-KW. 4,400-volt asynchronous generator, direct coupled to an "Allen" high-speed engine, complete with the necessary switchgear, for the Prahran City Council destructor works. The engine will be controlled by a governor which comes into operation if the overload speed of the generator is exceeded, the ordinary regulation depending on the steam available from the destructor works. These works are close to the generating station of the Melbourne Electric Supply Co., to which company the power generated at the destructor works will be sold in bulk. A complete underground haulage plant for the Duke and Main Leads Consols Gold Mining Co., together with a 50-H.P. motor for driving the puddling machines, were also in hand.

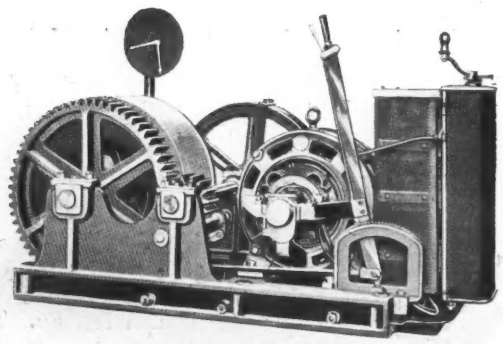
In addition to the electrical work, some large pumping plants for irrigation were in course of construction, and parts of large centrifugal pumps will be noticed in the views of the machine shops, from which some idea of their actual dimensions may be gained. These were being made for the water supply department of the Victorian Government, who had given the Weymouth Co. orders for five sets. Three sets are each of a capacity of 1,500 cb. ft. of water per min., against a 95-ft. head, with a guaranteed efficiency of 80 per cent, and each pump was to be driven by



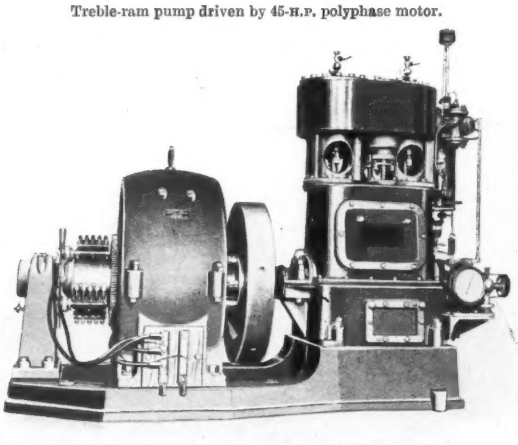
200-H.P. three-phase winding engine.



Treble-ram pump driven by 45-H.P. polyphase motor.



26-H.P. three-phase electric hoist.



60-KW. engine and generator.

FIG. 6.—EXAMPLES OF WORK CARRIED OUT BY THE WEYMOUTH CO., MELBOURNE.

a 360-H.P. triple-expansion high-speed engine. The other two are designed for 6,000 cb. ft. of water per min., with an 18-ft. lift, the guaranteed efficiency being 73 per cent. These would also be driven by triple-expansion engines. All these turbine pumps are made under an arrangement with the owners of the Smith-Michell turbine pump patents.

In drawing this article to a close, the author would express his thanks to the management of this company, through whose courtesy he was enabled to compile the foregoing notes.

THE MARKLISSA POWER TRANSMISSION PLANT.

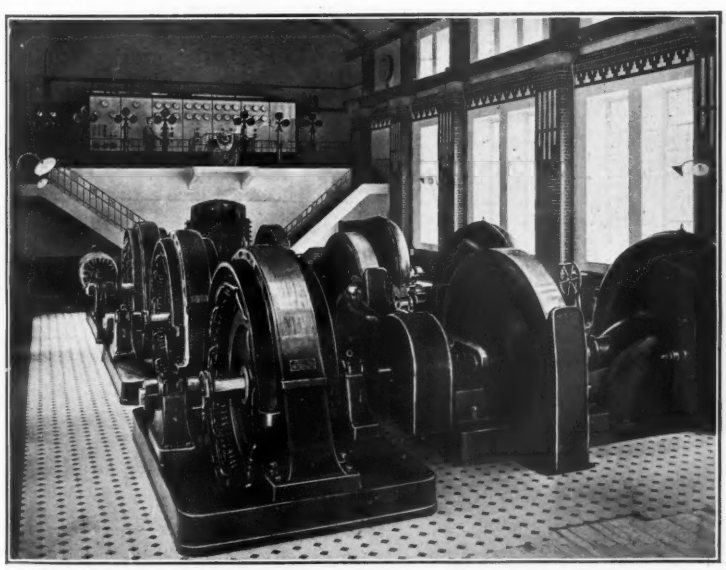
By H. ALFRED GRADENWITZ.

An interesting hydro-electric plant utilising the stored-up water of the River Queis (a tributary of the Bober) has been installed in connection with a reservoir of 15,000,000 cb. m. capacity, situated about 3 km. up-stream from the town of Marklissa. This reservoir was constructed in view of the tremendous inundations occurring in the region of those rivers, which in 1897 during the space of 24 hours occasioned damage of 10,000,000 marks.

Hydro-electric works in connection with this reservoir have been utilised for a short time for supplying light and power to some neighbouring places situated within 14 km. distance, and the power house is eventually to be connected by a transmission line about 30 km. in length, to a proposed larger hydro-electric station at Mauer, for utilising the stored-up water of the Bober in a reservoir of 50,000,000 cb. m. capacity. This larger power station will also be connected with a steam-operated power house at Waldenburg, situated a further 64 km. distant, thus providing a reserve both to the hydraulic and steam stations, while affording a possibility of supplying electrical energy to intermediate places.

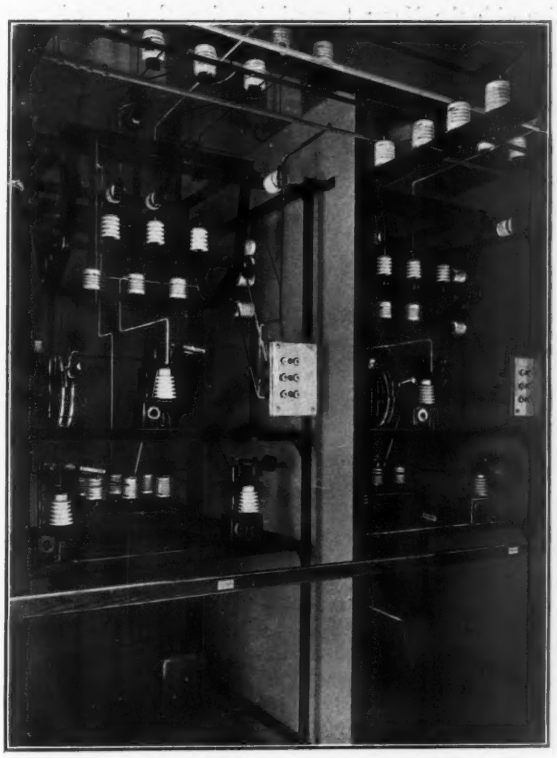
The Marklissa power house is situated about 100 m. below the reservoir embankment, and is supplied with the water required for operating the turbines through two underground conduits that terminate immediately behind the embankment, and within the power station, combine in a conduit 1·7 m. in diameter, whence pipes lead to each of the turbines.

The preliminary equipment of the power station comprises three Francis turbines, supplied by Messrs. Voith, of 715 H.P. each, at 375 R.P.M., and working under an average head of 26 m. In addition to these, there have been installed a small exciter turbine of 35 H.P., and an exciter converter of 64 KW. After its ultimate extension, which is to be carried out during the current year, the power house will comprise five similar turbine sets, of a total output of 3,575 H.P.



Interior of the Marklissa Power House.

The generators and switchboards have been constructed by the Siemens-Schuckert Works. The generators, which are coupled to the turbines through an elastic clutch, are designed for an output of 620 K.VA. generating three-phase alternating current at 10,000 volts pressure, with a frequency of 50 cycles per second; they are provided with 16 poles on the rotor.



Switch Cells, Marklissa Transmission.

The electrical energy generated at the power house is transmitted without the intermediary of any transformers, over three transmission lines, viz., to Marklissa (3 km.), Lauban (11 km.), and Greiffenberg (14 km.) respectively. At the receiving points the pressure is reduced to 220 and 120 volts respectively.

Another power transmission line, and the switchboard controlling the lines connected to the Mauer power house, has been recently completed. With a view to the considerable distances, the pressure in connection with the Mauer and Waldenburg transmission lines, is to be raised by two 750-K.VA. transformers from 10,000 to 20,000 or 30,000 volts.

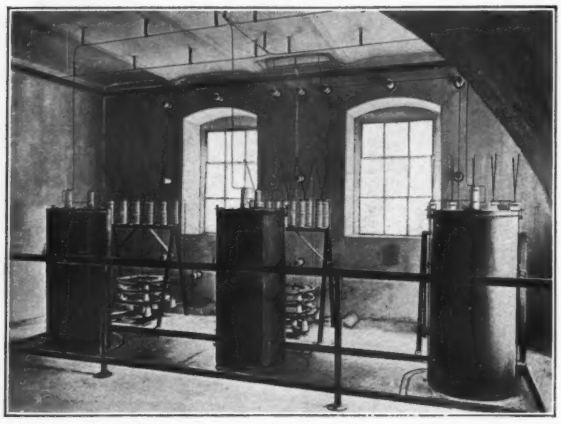
Special care was bestowed on designing the switchgear in such a way as to allow of its being readily supervised, while providing for safety.

A pilot motor, fitted to the turbine regulators, is used to regulate the load on each machine.

Oil switches were used exclusively, owing to the considerable pressure surges liable in the switching off of high-pressure currents with the aid of ordinary switches; these oil-switches are provided with electrical remote control. One of our views represents the switch cells used for the Marklissa and Lauban transmission lines, showing, in the upper portion, the time relays used to switch in the motor—situated in the lower portion—for actuating the oil switch, arranged in the centre of the

cell. There are two self-contained systems of bus-bars, which can be coupled by means of a hand-operated switch.

In order to afford a reliable protection against excess pressure, a combination of reaction coils, horn spark gaps, oil resistances and water-jet earthing devices was used. One of our views shows the arrangements chosen in connection with the Mauer transmission line, the oil resistances



Line Protective Devices, Marklissa Transmission.

being visible in the foreground, and the horn spark gaps and corresponding reaction stage coils farther back.

A special telephone plant has been provided for connecting the power station to the townships of Greiffenberg, Mauer and Hirschberg. As the low-pressure transmission lines are arranged on the same poles with the high-pressure lines, special safeguards had to be provided for avoiding leakage.

Water-level gauges on Siemens & Halske's system, indicating and recording the water level by means of floats and contact devices, are provided to indicate the level in the reservoir as well as the amount of water entering and leaving.

ELECTRICAL ILLUMINATIONS AT BRIDLINGTON.

Bridlington, that watering place on the Yorkshire coast which is year by year increasing its popularity in all parts of the country, has just made another addition to its already lengthy list of attractions. This takes the form of a scheme of electrical illuminations on the Royal Prince's Parade, which, by the way, belongs to the town, and the innovation, which is said to be the first of its kind in the country, is being closely watched by other seaside resorts.

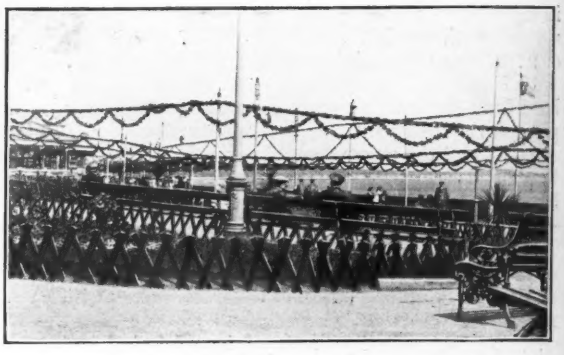
The question of illumination has worried the Parade

Bridlington: The Parade at Night and in the Daytime.

Committee for many years, and no satisfactory solution of the difficulties was forthcoming until Mr. A. J. Beckett, the borough electrical engineer, was called in to give his advice. Mr. Beckett sought to devise a scheme which should provide an artistic daylight decoration, independent of the night effect, and he has attained success by utilising thousands of yards of artificial foliage, coloured green, which presents a natural and pleasing appearance to the eye, Nature having been copied as closely as possible. The main promenade is decorated so as to form a continuous canopy 200 yds. long, and the grass plots and side walks are outlined with festooned garlands, the whole being in harmony with the general arrangement of the gardens and grounds.

The electrical wires are carried along the foliage, with a $2\frac{1}{2}$-c.p. electric lamp, alternately red, white and blue in colour, at every foot. There are 6,000 of these lamps, with special china waterproof miniature high-voltage lamp-holders, which are enamelled in green to harmonise with the foliage, and are entirely concealed during the day. The lamps are coupled up in sections by means of patent china couplings, and are run in series of 16 lamps, 14 volts per lamp, on a voltage of 220. This obviates any trouble arising through malicious damage to the lamps, for a broken lamp simply means a small section of light cut off, and not a blown fuse.

The work, which necessitated the use of about six miles of cables and wires, has been carried out by Messrs. Waring and Gillows, Manchester, who worked out the combined



Bridlington by Day.

design according to the general scheme suggested by Mr. Beckett. The opening ceremony was a great success. It was performed by the Mayoress (Mrs. C. G. Southcott), who was afterwards presented by the Parade Committee with the silver switch which she had used.

The photographs used in this article were taken by Messrs. R. Spurr & Son, Bridlington.

Malden.—The Council, on Monday evening, considered a report from the Parliamentary Committee to the effect that it had interviewed the Electricity Committee of Wimbledon Corporation with regard to the supply of electricity to Malden. Wimbledon required a guarantee against loss, and, subject to this, was prepared to entertain an application for a bulk supply. Malden

Committee recommended the Council to consider the advisability of applying for a provisional order, and that Messrs. Talbot and Stevenson, consulting electrical engineers, be engaged to advise the Council and prepare estimates as to the probable capital outlay and annual expense to be incurred by Wimbledon, and, alternatively, the cost to Malden, of providing a generating station. In opposition to the Committee's proposal, it was urged that the feeling of the district was against electric lighting on the ground of expense. The motion for the adoption of the report was negatived by 6 votes to 5.

NOTES.

(*Concluded from page* 178.)

Educational.—NORTHAMPTON POLYTECHNIC INSTITUTE.—Particulars of the commencement of day courses in mechanical and electrical engineering and electrochemistry appear in our "Official Notices" to-day.

Appointment Vacant.—UNIVERSITY OF BIRMINGHAM.—Assistant Lecturer and Demonstrator in Electrical Engineering (£150).

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station Officials.—MR. CHAS. CUTHBERTSON, electrician of the Longton Gas and Electricity Department, was on Friday last presented with a marble clock by the staff and employés of the department, to mark the occasion of his recent marriage.

Tramway Officials.—MR. A. W. BANISTER, late manager of the Norwich Electric Tramways Co., has been appointed manager of the New British Motor Cab Co., Ltd., London.

General.—On Monday last MR. A. L. WEEKES, general manager of the British Electric Calibrated Fuse Co., Harpenden, Herts, was presented with a pedestal writing-desk by the staff and employés on the occasion of his marriage to Miss Alys Linnell, of Rugby.

On the 17th inst. Mr. W. G. Roberts, charge-man of electrical fitters at the Pembroke Dockyard, who is leaving to take up the post of Admiralty assistant observer, was presented with a Gladstone bag, a case of pipes and a set of razors by his friends in the electrical fitting shop.

Mr. E. Raymond-Barker, who has just left in the Silvertown c.s. *Dacia* on a cable-repairing expedition, deposited with us some months ago a further series of articles on "Cable-fault Localisation Graphs in Practice." The pressure on our space has hitherto prevented us from inserting these, but we hope to commence their publication immediately on the author's return.

Obituary.—FRÖLICH.—We regret to record the death of Dr. O. Frölich, on the 6th inst., at Berlin, aged 66 years. Dr. Frölich was one of the great pioneers of the electrical industry, being associated with Messrs. Siemens & Halske in the days when telegraphs were the mainstay of electrical work; later, he turned his attention more particularly to the development of the theory of the dynamo and to the design of measuring instruments, while he maintained his interest in pure scientific research. Latterly he was connected with the Charlottenburg Technical High School as lecturer.

NEW COMPANIES REGISTERED.

Fife Tramway, Light and Power Co., Ltd. (7,188).—This company was registered in Edinburgh on July 3rd, with a capital of £200,000 in £1 shares, to acquire all or part of the share capital of the Dunfermline and District Tramways Co. and the Fife Electric Power Co., to construct or acquire light or other railways, electric or other tramways, and electric lighting and power supply works, &c. The subscribers (with one share each) are:—W. Low, Blebo, Cupar, Fife, merchant; K. Sanderson, 23, Rutland Street, Edinburgh, W.S.; F. B. Stuart, 63, Frederick Street, Edinburgh, W.S.; W. L. Wilson, 16, Charlotte Square, Edinburgh, clerk; A. Shepherd, 16, Charlotte Square, Edinburgh, W.S.; G. Ferguson, 16, Charlotte Square, Edinburgh, clerk; G. Balfour, 22A, College Hill, Cannon Street, E.C. The number of directors is not to be less than two or more than five; the first are to be afterwards appointed; qualification, 100 shares; remuneration as fixed by the company.

British Radio-Telegraph and Telephone Co., Ltd. (104,024).—This company was registered on July 13th, with a capital of £15,000 in £1 shares, to adopt an agreement with J. G. Balsillie, and to carry on the business of manufacturers of and dealers in radio-telegraphic and telephonic instruments and installations, electric and general engineers, &c. The subscribers are:—T. V. Smith, 30, Linden Gardens, Notting Hill Gate, W., electrical engineer, 100 shares; B. C. Turner, 87, Circus Road, St. John's Wood, London, insurance manager, 100 shares; T. B. Ince, 14, Cornhill, E.C., assessor and surveyor, 50 shares; W. H. Matthews, 32, Queen Victoria Street, E.C., solicitor, 100 shares; A. Knight, 4, St. Mary Axe, E.C., merchant, 100 shares. Private company. The number of directors is not to be less than two or more than five; the first are not named; qualification, 100 shares. Registered by G. F. Hudson, Matthews & Co., 32, Queen Victoria Street, E.C.

Caversham Motor Co., Ltd. (103,995).—This company was registered on July 12th, with a capital of £1,000 in £1 shares (950 preference), to carry on the business of electrical engineers, manufacturers of and dealers in motor carriages and other mechanically-propelled vehicles, &c. The subscribers are:—J. A. P. Price, 124, Castle Street, Reading, M.D., 90 preferred shares; H. N. Dickson, M.A., D.Sc., The Lawn, Upper Redlands Road, Reading, 25 preferred; Mrs. E. Woollan, Endellion, Priory Avenue, Caversham, 50 deferred; L. E. Stephens, The White House, Elmsworth, Hants., 25 preference; A. C. Brewerton, Kiln House, Caversham, Oxon, brick and tile manufacturer, 10 preference; T. S. English, 186, Oxford Road, Reading, corn merchant, 10 preference; C. G. Chambers, 1 Prior Street, Reading, solicitor, 1 preference. Minimum cash subscription, 60 preference and all ordinary shares. Registered without articles of association. The first directors are J. A. P. Price, H. N. Dickson, M.A., D.Sc., and A. C. Brewerton. Registered by Solicitors' Law Stationery Society, Ltd., 28-9, Chancery Lane, E.C.

Chippenham Electric Supply Co., Ltd. (104,107).—This company was registered on July 19th, with a capital of £5,000 in £1 shares (2,500 5 per cent. preference), to adopt an agreement with the Chippenham Corporation, and to carry on in Chippenham and elsewhere in Wiltshire the business of suppliers of electric light, electricians, engineers, &c. The subscribers are:—J. H. Edwards, 127, Victoria Street, Bristol, electrical engineer, 400 shares; E. Neale, 10, High Street, Chippenham, chemist, 100 shares. Private company. The number of directors is not to be less than two or more than five. The first are J. H. Edwards and E. Neale (both permanent). The Chippenham Corporation may nominate one permanent director, who shall be a member of the Corporation and not a shareholder in the Chippenham Gas Co.; qualification, of permanent directors, £100; of ordinary directors, as fixed by the company. The directors shall issue 100 5 per cent. cumulative preference shares to the Chippenham Corporation as fully paid up, and exchange the same for £100 debenture stock or shares, when any shall be issued by the company, referred to in the agreement. Registered by Waterlow Bros. & Layton, Ltd., Birchin Lane, E.C.

Lighting, Ltd. (104,154).—This company was registered on July 21st, with a capital of £1,000 in £1 shares, to carry on the business of manufacturers of and dealers in lamps, burners, parts and apparatus for lighting and other purposes, electricians, engineers, &c. The subscribers (with one share each) are:—F. S. Mitchell, 3, Market Street, Dewsbury, accountant; R. S. Naylor, 3, Market Street, Dewsbury, accountant. Private company. Table "A" mainly applies. Registered office, 25, King Street West, Manchester.

Filaments, Ltd. (104,108).—This company was registered on July 19th, with a capital of £500 in £1 shares, to adopt an agreement with J. W. H. Reynolds, for a secret process for the manufacture of metal filaments for electric lamps, and to carry on the business of manufacturers of and dealers in metal filaments for electric lamps and apparatus used in connection therewith, &c. The subscribers (with one share each) are:—J. W. H. Reynolds, 9, Braxted Park, Streatham Common, S.W., electro-chemist; W. G. Bate, 35, Bedford Row, W.C., solicitor. Private company. The number of directors is not to be less than two or more than four; the first are J. W. H. Reynolds and W. G. Bate. Registered office, 6, Newcastle Street, E.C.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Electro-Mechanical Brake Co., Ltd. (98,276).—Mortgage or charge on certain patents for inventions relating to an electro-mechanical brake, dated June 7th, 1909, to secure not more than £1,500. Holder: G. Law, jun., Landoak House, Kidderminster. Also mortgage on certain book debts, dated June 9th, 1909, to secure £140. Holders: Metropolitan Bank of England and Wales, Ltd., West Bromwich.

Anglo-Argentine Tramways Co., Ltd. (25,363).—Trust-deed dated July 1st, 1909, to secure £1,733,380 4½ per cent. debenture stock, charged on the company's undertaking and property, present and future, including uncalled capital, subject to certain prior charges. Trustees: The Trustees, Executors and Securities Insurance Corporation, Ltd.

Bogota Telephone Co., Ltd. (69,059).—Particulars of £25,000 second debentures created October 30th and secured by trust-deed dated December 12th, 1906, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908; the whole amount being now issued. Property charged: Certain land with buildings thereon in Bogota, Colombia, used in connection with the telephone service, concessions or grants relating to the said service, working plant, engines, machinery, poles, lines, installation, and the company's undertaking and property, including uncalled capital, subject to £15,000 first mortgage debentures. Trustee: S. H. Jenks, Barrow Hedges, Carshalton.

Electric Supply Corporation, Ltd. (52,036).—Trust-deed dated July 18th, 1904, was stamped to cover a further £20,000 in addition to £110,000 already registered. Property charged: Company's assets. Trustees: F. Tufnell, Kenley, Surrey, and W. B. M. Bird, 58, Cadogan Place, S.W.

CITY NOTES.

Direct United States Cable Co., Ltd.

THE sixty-fourth ordinary general meeting of the shareholders of this company was held on Tuesday at Winchester House, Mr. E. M. Underdown, K.C., in the chair.

In proposing the adoption of the report (see ELECTRICAL REVIEW, July 23rd, page 147), the CHAIRMAN said that the revenue for the past six months to June 30th last, after deductions on the payments, amounted in round figures to £56,445. The working and other expenses, including income-tax, but exclusive of cost of maintenance, absorbed £25,036, leaving a balance of £31,409 as net profit, making, with £4,506 brought forward, a total of £35,915. That had been appropriated as follows:—Interim dividend of 4s. per share on March 31st, absorbing £12,142, a proposed final dividend of the same amount, and a bonus of 1s. per share to June 30th, requiring £15,177, transferred to reserve fund £5,000, leaving a balance of £3,596 to be carried forward. A considerable period of trade depression was, he hoped, now passed over and cable business showed signs of revival, with the result that their revenue exhibited an improvement of £5,077 during the past half-year, as compared with the corresponding half of 1908. The working expenses in London and at the stations showed a slight variation as compared with those in the corresponding period. The reserve fund had been credited with £9,733 from interest on the investments; £1,501 from profit on the sale of securities and with the £5,000 transferred from revenue. On the other hand, it had been debited with £13,857 for cost of maintenance of cables, and the balance of the account now amounted to £510,267. The investments stood in the balance-sheet at £493,004, after allowing for the provision of £40,000 made two years ago on account of market depreciation. It was satisfactory to note that their market value at present was between £9,000 and £10,000 in excess of the reduced figure at which they stood in the accounts. Although on the present occasion they had

had some heavy repairs, the reserve fund remained fully adequate to meet their requirements, and, in fact, the situation had improved. Dealing with the results for the whole year, the receipts had amounted to £112,780, less expenses £50,393, leaving a balance of £62,387. They had paid in dividends £51,603; £10,000 had been placed to reserve, and they had an increased balance in hand of £784 as compared with June, 1908. The reserve account had been increased in balance during the year by £5,071; £10,000 had been transferred from revenue; interest on investments had yielded £18,882, profit on sale of securities (£1,595) giving a total of £31,447. From that they had to deduct £24,901, the cost of maintenance of cables, and £505, the cost of the installation of a gas plant at their station on the West Coast of Ireland. When they heard criticisms as to the cost of messages to the public, it was as well to remember that the cost per word was no real guide. So extensive was the use of codes by means of which one word was made to embrace many words and sentences, that the actual cost to the public was even below the word rate suggested by those who had no practical knowledge of distant telegraphy. Their relations with the allied companies were excellent. The Government had, he thought, met them in several points with regard to the continuance of their business and licence, and altogether he thought he might congratulate the shareholders upon the position of the undertaking.

Sir James Pender, Bart., seconded the resolution, and the report was adopted.

City and South London Railway Co.

The Right Hon. C. B. Stuart Wortley, M.P., presided at the offices, Finsbury Pavement, on Tuesday, July 27th, over the fiftieth ordinary general meeting of the above company.

In moving the adoption of the report (see Electrical Review, July 23rd, page 147), the Chairman said they met in more encouraging circumstances, and the board were able to claim that they were right, when six months ago they said that the comparatively unfavourable results of the half-year then under review were due to temporary and abnormal causes. There were many gratifying features in the working of the last half-year. They had a net increase of £1,062 in gross receipts, and a net decrease of £989 in expenses; so that they were in a position to carry to net revenue account a balance increased by £2,051. After deducting from this the diminution of £166 in the carry-over from the December account, and the increase of £427 in debenture interest, but adding, on the other hand, the £204 saved on the item of general interest, they got an increase in the balance available for dividend of £1,662. They had £269 more to pay now than last year in dividends on preference stocks; so that there was a final resulting improvement of £1,393 in the sum available for the ordinary shareholders. By carrying forward only £457 less than they did this time last year, they were able to find the £1,850 necessary to provide the extra ¼ per cent. which the ordinary shareholder so well deserved, and which they recommended that he should receive. This result, though not brilliant, was at least satisfactory. It was satisfactory not only as coming hand in hand with the fact that the half-year showed a larger amount of gross receipts and a larger number of passengers carried than any previous half-year in the history of the railway, but also because the percentage of working expenses showed a gratifying decrease (as between the June half-years of 1908 and 1909) from 46·28 per cent. to 44·63 per cent. As showing economy in management he might say that they had kept their service going with 92,673 trains, against 94,636. Had there been 28 days in February, 1908, instead of 29, the number of trains in the 1908 half-year would have been about 600 less than the 94,636. The number of passengers carried per train had been 121·15, against 115·09. The receipts per train had been 18s. 3·64d., against 17s. 9·04d., and per train-mile 2s. 5·93d., against 2s. 5·03d. The only receipt which showed a decrease was the one which, less than all others, could be influenced by management. He referred to the receipts per passenger, which had gone down from 1·75d. to 1·72d. This merely showed that the average distance travelled had been shorter. On the other hand, all the expense ratios showed decreases:—1s. 2·11d. total expenses per train-mile, against 1s. 2·16d.; loco. expenses per train-mile, 4·52d., against 4·68d.; and traffic charges, 6·13d. per train-mile, against 6·27d. The accounts showed an increased amount paid during the half-year in local rates. They considered that in several districts they were assessed at too high values, and the general manager had instructions to endeavour by making proper representations to the assessment committees, to get valuations reconsidered in their favour. Decreases in local bookings at the "Angel" and Moorgate seemed to show that the limit of L.C.C. tramway competition on the north side had not yet been reached. But local bookings at Euston and King's Cross continued slowly to increase, and through bookings made up well for diminished local bookings—there having been a gratifying increase of this business with all three of the underground companies' tubes. A noticeable feature of the half-year was the fact that (except at King's Cross) Sunday bookings were uniformly down—the average drop being £18 per Sunday. The main burden of this loss seemed to arise at the Bank and certain stations on the south side. Competition with L.C.C. tramways and the motor-omnibuses continued to be so severe that the question had arisen whether there should not be some revision, in favour of the passengers, of certain fares and season-ticket rates. This important matter was under the consideration of the board. The competition that they suffered from the L.C.C. tramways and the diminished receipts on Sundays were, perhaps, more closely connected than might be supposed. All through the early hours of Sunday, from 8 o'clock to nearly 12 noon, when no City and South London trains were running, the L.C.C. tramways enjoyed to the full a monopoly of the business of carrying South London people to the Elephant and Castle Station and to London Bridge, as well as to all such places on the north side of the river as could be reached by the Westminster Bridge tramlines and their extensions. At the Elephant they found connecting trains all Sunday morning to all stations on the Bakerloo line and lines connected with it; and at London Bridge they found facilities for Sunday excursions by the Brighton Railway and South-Eastern and Chatham and Dover Railway to places in Kent and Sussex, and for embarking hard by on the excursion steamers to the various places on the East Coast. Most of these opportunities were past and gone by the time that the City and South London Sunday trains began to run. On all the four West End tube railways, as well as on the great railways having termini in London, trains were running on Sunday morning during most of the time that on the City and South London business was at a standstill. The Great Northern and City Tube Railway, which joined up to their station at Moorgate, now started its trains on Sundays about the same time as they did. They had arranged with the Great Northern and City to start running on Sundays at about the same time as they did, their trains beginning in future from Euston and from Clapham Common about 8.15 in the morning. The board did not think they could with justice to the shareholders continue to allow during all these hours, those who on other days were their own passengers and patrons, to be taught and encouraged to use other systems than their own. What the L.C.C. did could not be supposed to be against the conscience of the people of London, or they would not be suffered to do it. The board proposed, therefore, to defend themselves against this particular competition by modifications of their Sunday time table, which they hoped would shorten the actual hours of Sunday duty worked by individual members of their staff, and yet would preserve to the great majority of them the alternate Sunday off which they now enjoyed. The report spoke of the projected high-level subway to connect their station at the Bank with the stations of the Central London and Waterloo and City lines. Parliamentary sanction to this scheme might be regarded as practically assured. Though not eventful, the half-year's working had been neither uninteresting nor unhopeful.

Mr. C. S. Grenfell seconded the motion.

Mr. E. Levy thought the time had arrived when they ought to have a profit-sharing scheme for the employés. He suggested that 5 per cent. should be deducted from the shareholders' dividends each half-year and divided amongst the servants of the company who had been over six months in the service in proportion to the wages and salaries received.

Mr. Porter suggested that in conjunction with other tube railways, they might issue special season tickets in the middle of the day for commercial travellers, at a cost not exceeding £4 per quarter. He also thought that some of the stations which did not pay might be closed.

The Chairman, in reply, said one of the difficulties of a profit-sharing system on railways was the minuteness of the amounts to be divided. In principle, they all agreed it was a good thing. As to commercial travellers' tickets, the difficulty was that other railways did not issue season tickets. It was true that the City Road station did not pay.

The report was then adopted.

Prospectuses.—*Brieh Rubber Estate, Ltd.*—An issue of 20,000 shares of £1 each at par has been offered for subscription this week. The company will acquire the Brieh estate of 1,190 acres in Perak, F.M.S., 506 acres being planted.

Sylverlyte (1909), *Ltd.*—During the past week this company offered for subscription 50,000 shares of £1 each at par. The company has been formed to take over the business of the Sylverlyte Electric Lamp Co., Ltd., which was formed in May, 1908, with a capital of £2,750, to acquire and work an invention (No. 5,191 of 1904). The business of the syndicate has been confined to the production and sale of motor-car lamps, using a special lens, and it is proposed to extend the use of the company's "Sylverlyte" lenses.

Sungei Krian Rubber Estate Ltd.—The list closes to-day in an issue of 45,000 6 per cent. cumulative participating preference shares of £1 each. The company will acquire the Samagaga estate of 2,500 acres in Perak, F.M.S.

Stock Exchange Notices.—The Committee has appointed a special settling day as under:—

Friday, July 30th.—Bombay Electric Supply and Tramways Co., Ltd.—Scrip, fully and partly paid, for £150,000 5 per cent. second mortgage debentures.

Southern Electric Tramways Co. of Buenos Aires (Compania de Tramways Electricos del Sud).—Scrip, fully paid, for £100,000 5 per cent. first mortgage debentures, Nos. 1 to 800 of £100 and 801 to 1,800 of £20 each.

And ordered the same to be quoted in the Official List.

The Bristol Tramways and Carriage Co., Ltd.—An interim dividend has been declared at the rate of 6 per cent. per annum for the half-year ended June 30th, as last year. Dividend warrants will be posted to-day.

County of London Electric Supply Co., Ltd.—The directors have declared an interim dividend for the half-year ended June 30th, 1909, on the ordinary shares at the rate of 4 per cent. per annum, less income-tax, as last year.

National Telephone Co., Ltd.

MR. GEORGE FRANKLIN presided on the 22nd inst. over the meeting of this company held at Hamilton House, Victoria Embankment.

In moving the adoption of the report (see ELECTRICAL REVIEW, July 16th, page 106), the CHAIRMAN reminded the shareholders that the figures were only accurate for five months, and the sixth month was an estimate. The income accrued for the six months ending June 30th was £1,546,837, as compared with £1,452,569 a year ago, an increase of £64,798. That increase was not quite at the usual rate of progress, but it was largely accounted for by the depression in trade, and to some extent by the necessity of the company restricting its capital expenditure, so as to coincide with the termination of its licensed period. The royalties paid to the Post Office had increased from £139,531 to £148,951, a difference of £9,419. There was very little to say in regard to that item, except the chronic complaint which was always made at those meetings that it was a charge imposed upon the telephone industry without any justification. The working expenses amounted to £893,767, as against £828,969, an increase of £64,798. Apart from the expenses of the company, due to the growth of the business, there were extra items of expenditure, such as the increase in the rates, which had gone up in the half-year £5,843, and an extra outlay on lines, including renewals of £10,148. Another item which went to swell the expenses was the maintenance of the Post Office wires, towards the cost of which they had to make some contribution, although the money should, strictly speaking, come out of capital. The net result of the half-year (after deducting royalties) was a profit balance of £504,118, as compared with £484,068, or a net increase of £20,050, of which £12,954 was absorbed by the debentures and other interests, £124,607 by the preference and deferred shares, and the directors recommended the placing of £150,000 to reserve, an increase of £10,000 over the amount placed to that item a year ago. That would leave a balance of £110,000 to be carried forward. The rentals for unexpired terms of running contracts pursued their upward course, as was to be expected, the figure standing at £1,366,283, as against £1,314,591, showing an increase of £51,692. The capital expenditure during the past six months on construction of exchange and private stations was £313,393. It was the company's policy now not to spend any money which would not be reproductive by December 31st, 1911, when their licence expired. They had made an offer to the Post Office, which had been accepted in part, to provide for the requirements of the Post Office after 1911, provided that the company were insured against any loss. The Post Office had agreed to that so far as such capital expenditure might relate to new work, which did not involve the supplanting of existing plant; but as to other classes of work, it had not been yet possible to come to any arrangement. The reserve fund now stood at £3,226,381, and that figure included the amount proposed to be added that half-year. All of that money was invested in the company's business. Questions had been asked in Parliament suggesting that the company's plant was antiquated and obsolete, and that they were starving the system, but he could say that the plant was never in a better condition, and when the undertaking was acquired by the Government it would be found that it was in accordance with the agreement made with the Post Office. As to the recent legal proceedings in which they were involved with the Postmaster-General with reference to what were known as A to B lines—that was a communication between a person and a doctor or his stockbroker, such lines not having any connection with the company's exchange—the shareholders were aware that the Government said they ought to pay a 10 per cent. royalty on them, but the Court of Appeal upheld the views of the company that they were not bound to pay such royalties. On the case being taken to the House of Lords the decision was reversed, and the company had now to pay royalties on that class of business. The effect of that would not fall upon the present shareholders, as the directors had set aside a half-year's profit to meet the charge in the event of their having to meet it. The company recognised their full obligation to the public up to the end of 1911, but they had not recognised, and did not intend to recognise, any provision for the needs of the subsequent period. With reference to a recent statement of the Postmaster-General that it would be in the public interest if the undertaking could be acquired before the end of 1911, the company were perfectly willing to hand it over before, provided they were fully compensated for the loss of their unexpired tenure.

MR. G. SANDS seconded the motion, and the report was adopted.

United River Plate Telephone Co., Ltd.

THE meeting of this company was held on Tuesday, July 20th, at Winchester House, E.C., Sir Irving Courtenay presiding.

The CHAIRMAN, in proposing the adoption of the report (see ELECTRICAL REVIEW, July 16th, page 106), said that the steady growth and development of the Argentine Republic, which had been a feature of recent years, still continued, and was reflected in every department of the business, resulting in an increase both in gross income and net profit. During the year under review they had added considerably to the number of their subscribers both in Buenos Ayres and the provinces. They had opened new exchanges in Dolores, General Paz, General Belgrano, Nueva Roma, Lobos, Balcarce and Canuelas, all of which were important centres and would pay a good return on the capital invested in them. They had also started work on the extension of their main southern line from General Belgrano to Azul, a line which was destined eventually to be carried to Bahia Blanca, and to become one of their most important trunk routes, and in response to strong and influential demands they had authorised the extension of another section of the southern line from Dolores to Mar del Plata. During the year they had continued the work of extending their subways in Buenos Ayres and reconstructing their overhead circuits for common battery working. The three new exchanges in that city, which had been constructed on the common battery system, gave great satisfaction to their engineers, and to the general public, and they were now busily engaged in altering their Avenida building, which was their principal exchange in Buenos Ayres, to receive a new common battery board which they hoped to have working within the next nine or ten months. In the beginning of the present year, Sir John Gavey visited Buenos Ayres, and he reported that the new boards already installed have resulted in a most appreciable improvement in the service since his previous visit about 18 months before. Besides their subway work in Buenos Ayres, they had also done a considerable amount of similar work in Rosario, Cordoba and Bahia Blanca. Passing to the accounts, they would see that the capital was increased by £100,000, the amount of the issue made in April, 1908. The subscriptions paid in advance had increased by about £3,000, which was a satisfactory feature, while the reserve fund and the reserve for renewal of plant remained at the same figures as before, nothing having been added to these last year. They proposed, however, this year to increase the reserve fund by £25,000. The directors felt very strongly, and had no doubt the shareholders would agree with them, that, in view of the continual expansion of the company, it was necessary to build up the reserve. Nothing was more calculated to give stability to an enterprise than a reserve in proper proportion to the capital, and as a considerable part of the reserve was invested in the business, and was, consequently, revenue producing, the shareholders were getting the benefit both ways. They had expended £119,590 on capital account. Last year they wrote £25,000 off the special replacement account, but this year it had again increased to £35,138, and as the work of conversion was still proceeding, they proposed this year to write off £32,000 from this account, which would give them a fairly clean slate. Their securities were considerably increased from last year. Stock of materials was some £600 under last year's figure. Of course, with an expanding business, it was necessary to keep a fairly large stock, but this item was most carefully watched, both with the view of keeping the figures as low as possible, and also to prevent waste or leakage. Coming to the profit and loss account, there had been an increase in receipts and expenditure in the Argentine of £36,300 and £23,000 respectively; the cumulative result being that there was an increase in net profit for the year of about £12,700, and he ventured to think they would find these results satisfactory. Of course, they owed them largely to the skill and energy put into the business by the staff, and as the staff were forming a provident fund in Argentina, towards which they would themselves subscribe for the purpose of mutual help in sickness or misfortune, the directors believed the shareholders would be glad to follow the excellent example set by other public companies, and make a donation out of the profits towards such a laudable object. The sum the directors recommended was £2,000, and after more experience had been obtained from the actual working of the fund, the question of future grants could be considered on its merits. They looked forward to the future with confidence. As the population increased, so did the demand for their services. There was still plenty of outlet before they reached the proportion of telephones to inhabitants which had been reached in Europe or the United States. To provide for the increasing wants of the business it would be necessary to make a new issue of capital in the autumn. The amount required would be £150,000, and while it was too early to enter fully into particulars, he had no doubt that the terms would be acceptable to the shareholders. The directors recommended a final dividend of 5 per cent. on the ordinary share capital, making with the interim dividend paid on December 31st last, a return of 8 per cent. for the year, free of income-tax.

The report was adopted.

Mexico Tramways Co.

THE directors' second annual report, for the year ending December 31st, 1908, shows that the net revenue for the year, after paying all expenses and fixed charges, amounted to $459,648.99, which added to the balance of $151,701.18 standing to the credit of profit and loss account at the end of the previous year, brought up the balance of such account to $611,350.17. During the year four quarterly dividends each at the rate of 4 per cent. per annum were paid to the shareholders, absorbing $240,000, and leaving a credit balance on profit and loss account of $371,350.17 to be carried forward to next year. During the year the sum of $1,027,294.22 was spent on capital account, extensions, improvements and the general equipment of the tramways system. The outlay already incurred has had the result of reducing the ratio of working expenses from 56 per cent. in 1907 to 52½ per cent. in the year now under review, while the results for the first few months of the current year show a still further reduction. As the company now has very complete car shops, thoroughly equipped with modern tools for wood and metal work, all of the rolling stock required is now being constructed by the company. The quality of the work turned out by the shops is fully equal to that in the imported cars and the cost, ready for service, is considerably less than that for which they could be imported. The policy of the company, in using to the greatest possible extent, native materials and native labour in the construction of its rolling stock, has met with the very cordial approval of the authorities. To guard against loss of

equipment by fire, an automatic sprinkler system of the most approved type has been installed in all the company's car barns and shops as well as in the principal offices.

At the present time (June, 1909) the tramways system consists of 171·01 miles of track, of which 131·82 miles are operated by electricity, 32·90 miles by mules and 6·29 miles by steam; 13·82 miles of electric track have been added since the report of 1907. It is anticipated that by the end of 1910 the whole system will be equipped and worked by electricity. The car equipment at the present time (June, 1909) consists of the following:—

Electric passenger cars and trailers	312
Mule passenger cars	70
Freight equipment	203
Funeral special equipment	45
Miscellaneous equipment, carts, wagons, &c. ...	45
	675

Since the date at which the accounts for this report were made up the company has acquired a controlling interest in the Mexican Light and Power Co., Ltd., by the purchase of 84,000 ordinary shares in the capital stock of that company. These shares were bought at a price of $80 per share, the purchase price being provided by the issue of the company's shares at $140, being at a premium of $40 per share. This step was taken with the object of assuring a certain and increasing supply of power for the tramways system which is of vital importance to the company, but the directors are satisfied that apart from this consideration, the acquisition will prove a remunerative investment, and with the centralisation of the management will result in considerable economy in the working of both companies. With a view of providing for the rapidly growing needs of the tramways business and in order to assist in the financing of the Mexican Light and Power Co., Ltd., who are carrying out large extensions to cope with the demand for power, the directors recently created an issue of 6 per cent. 50-year mortgage debenture bonds and sold in London £1,250,000 of such bonds. In view of the large interest of this company in the Mexican Light and Power Co., Ltd., the annual reports and accounts of that company will be sent to shareholders in this company with this and subsequent annual reports. The legal action referred to in the last report, brought against the Mexico Electric Tramways, Ltd., by a shareholder in that company, for the purpose of annulling the lease, has been settled on terms satisfactory to this company, and the lease, therefore, remains in force, and the directors are satisfied that the operation under such lease will be most satisfactory for all concerned. The following statistics relating to the operations of the company indicate the continual expansion of its business:—

	Gross earnings (Mexican currency).	Passengers carried.
1906	$4,210,768·00	54,448,225
1907	$4,924,075·00	64,628,567
1908	$5,828,574·00	70,857,661

Comparative Statement of Track Mileage.

	Electric.	Mule.	Steam.	Total.
1905	98·47	39 16	12·33	149·96
1906	118·00	39·00	12·00	159·00
1907	118 00	37·00	12·00	167·00
1908	125·41	37·88	7·88	171·17
June, 1909	131·82	32·90	6·29	171·01

Metropolitan Railway Co.

The directors report that the total receipts for the half-year ending June 30th, 1909, amount to £379,487, and the expenses to £193,243, leaving a profit of £186,244. Compared with the corresponding half-year of 1908, the receipts show an increase of £22,700, and the expenses a decrease of £6,537. The expenditure is at the rate of 56·25 per cent. of the total traffic receipts, as compared with 60·36 per cent. in the corresponding period. The net revenue account, after providing for the interest upon the debenture stocks and other fixed charges and for electrical depreciation, shows a balance of £137,075, which will permit of the payment of the dividends upon the preference stocks, and leave a balance of £32,564 available for dividend upon the ordinary stock. The directors recommend a dividend upon the ordinary stock, for the past half-year, at the rate of £1 per cent. per annum, carrying forward £3,904. The Surplus Lands Committee announce that the dividend on the surplus lands stock, for the past half-year, will be at the rate of £2 15s. per cent. per annum, as in the corresponding half-year. The development of the passenger traffic resulting from the improved train services and through bookings with the tube railways, has been well maintained; while the new express parcels service, which was brought into operation at the beginning of the year, has also been very successful, and has attracted a large amount of new business. The inauguration on July 1st of a morning and evening through train service between the City and stations on the Aylesbury and Uxbridge extensions, thereby obviating the change of trains at Baker Street, is a great convenience to the public, and cannot fail to have the effect of securing additional traffic to the railway. The Imperial International Exhibition at Wood Lane was opened on May 20th last. The traffic from this source has not, so far, been so large as that obtained from its predecessor, the Franco-British Exhibition, but it will no doubt develop considerably during the forthcoming holiday and excursion season. The Bill deposited by the North-West London Railway Co. was considered by a committee of the House of Commons in May last, when this company took an active part in opposing it, and the Committee, after eight days' hearing, decided not to allow the Bill to proceed. The electrical plant and machinery have worked very satisfactorily throughout the half-year, and the current is still produced at a low rate per unit. The installation of automatic signalling on the Inner Circle is now practically completed, and has resulted in greatly improved punctuality in the running of the trains. A new station is in course of erection at Dollis Hill, in order to serve the rapidly-growing neighbourhood between Willesden Green and Neasden. A goods receiving depôt is being constructed at Farringdon Street, which will be brought into use before the end of the current half-year.

Year.	Number of passengers.	Gross receipts for passengers, goods, minerals, and tolls.
1907	96,859,108	£640,838
1908	99,846,735	£680,357
1909 To June 30th	49,647,166	£343,566

Sao Paulo Tramway, Light and Power Co., Ltd.

The report of the directors for the year ending December 31st, 1908, which was recently submitted to the annual general meeting, states that, notwithstanding depressed business conditions, an increase in the gross and net earnings of the company took place. The gross earnings amounted to $2,287,410·56, an increase of $175,887·42, and the net earnings were $1,504,359·78, an increase of $108,486·28. A sum of $92,065·48, which has been charged to the contingent account, was expended for renewals and replacements; and to meet such expenditure, and provide for reconstruction of tracks, the directors have set aside $300,000 from the year's earnings to the above account, and $17,968 has been already charged against this appropriation. During the year the track mileage was increased by 4·75 miles; the Santa Anna Railway, which was acquired in the previous year, has been replaced by an electric line, and was opened on October 8th. The electric lighting connections show increases of incandescent lamps from 44,319 to 51,320, and of arc lamps from 1,251 to 1,458. There are now 4,209 lighting consumers, and the flat rate basis of charging is being superseded by meter charges, which it is expected will prove beneficial to the company. During the year 764 houses were wired for electric light, this being nearly 50 per cent. of new houses erected. In the power department, the connected load shows an increase of 3,553 H.P.; contracts in hand this year are expected to add a further 1,500 H.P. The total of motors now installed is 9,555 H.P. During the year shut-downs at the power house only aggregated seven minutes in all, and transmission line troubles have been overcome. The power house was extended to accommodate three additional units, and steel poles were substituted for wooden ones on the transmission line, leaving only 25 per cent. to be replaced in future. The rolling stock was increased by 25 passenger cars, and various additions made to substation and transformer plant and mains. To meet this capital expenditure the directors during the year disposed of $1,200,000 of capital stock; the premium on those shares, amounting to $161,562·77, was transferred to the reserve fund. The accounts show that the surplus earnings, together with the balance from the previous year, amounted to $1,795,790·45, from which three 2½ per cent. and one 2½ per cent. dividends were paid, absorbing $836,538·46; $300,000 was transferred to contingency account, and a balance of $659,251·99 carried forward.

Madras Electric Supply Corporation, Ltd.

The third annual meeting of the shareholders of this company was held on Friday at Salisbury House, London Wall, Mr. Arthur M. H. Walrond presiding.

The Chairman, in proposing the adoption of the report (see Electrical Review, July 23rd, page 147), said that the outlay on capital works amounted to £225,348. They had made a loss of £1,500 on the working of the temporary plant. That was not surprising, and while no profit was anticipated, they never expected to have to run that small plant for such a long time, and the loss, therefore, was larger than it would have been had they been in a position to supply current from their main station on the expected date. The profits of the tramways company had increased, and they had received a 5 per cent. dividend on that investment. The board had had a very anxious time, due not to any fear on their part as to the future prospects of the company, but solely on account of the very serious delay in the completion of the contract. As they were aware the company was formed to take over a concession, held by Messrs. Crompton & Co., their contractors. The concession was handed over to them free of charge on the condition that the contract for the work should be given to Messrs. Crompton. Unfortunately there was no penalty attached to the contract for failing to complete within a given time. The board were, however, assured that two years would be ample time, and Messrs. Crompton led them to believe that that time might be considerably accelerated, and that they might very possibly be obtaining current in September, 1907. The great delay which had taken place in completing the contract had materially affected, but only for the moment, the financial position of the company. The delay in completing the work raised a question between the company and Messrs. Crompton, which was largely a legal one, and the question was receiving the best consideration of the directors, who were resolved to adopt every means in their power for the protection of the company. They had received a telegram saying that the buildings were now practically complete, and that included the sub-stations at Mylapore, and for the tramways. The complete

plant would consist, on the direct-current side for the town supply, of plant of a capacity of 2,000 KW., capable, it was estimated, of supplying current for fans and lighting, to an equivalent of 100,000 lamps connected to the mains. On the alternating-current side they had plant of 1,500 KW. capacity for the supply to the tramways and workshops in the town. The tramways had contracted to take or pay for at least one million units per annum, and although that supply must be made before long, he regretted to say that even to-day the contractors could not give them a definite date for commencing the tramway supply. Independently of the tramways they had applications equivalent to 21,500 lamps, and they had already connected up an equivalent of 14,000 8-C.P. lamps. The number of inquiries for both lighting and power purposes was very encouraging. An arrangement was practically concluded for supplying the Madras Port Trust with an estimated consumption of 40,000 units per annum. They failed to obtain the contract for street lighting, the municipality having decided at the last moment to adopt another form of illuminant. They had applied for a licence to supply to Fort St. George, which they believed to be a large consumer, and meanwhile, with the sanction of the Indian Government, they were giving a supply to the Army Temperance Association at the fort from an overhead main. He thought he had said sufficient to indicate that there was every encouragement for the future. They would probably have to raise more capital before long, part of which would be wanted on account of delay in completing the contract, but they would undoubtedly require, from time to time, extra capital for extensions of mains to keep pace with increased requirements, and there was every reason to believe that capital for this latter purpose would be remunerative, and mean increased net profit.

Sir RALPH MOOR, in seconding the motion, said he could assure the shareholders that the importance of the early completion of the work had been appreciated by the board from the very commencement; so much so, that when Messrs. Crompton indicated the possibility of their being able to obtain current by September, 1907, the board offered them a bonus if they succeeded in doing that. The delay during the past year had been most disheartening, considering the efforts the directors had made all along to get early completion of the contract.

The report was adopted.

African Trans-Continental Telegraph Co., Ltd.

THE directors in their annual report for the year ended March 31st, 1908, state that the company's lines continue in good working order and condition. Interruptions to telegraphic communication during the year under review were few and of short duration, except in two cases where the interruption on one section of the line, caused by the natives having cut and removed portions of the wire, lasted for over a week. It has, however, been found necessary to renew the telegraph wire at Tete, in Portuguese East Africa, where the line crosses the Zambesi in a single span of 2,178 ft. It may be stated that the line and poles at this spot are run in duplicate, in order to guard against the interruption to traffic that would result from a breakdown if the line were single. The Northern terminus of the line is still at Udjidji, on the East Coast of Lake Tanganyika, no arrangements having yet been found possible for the provision of funds for its further construction northwards. The gaps in the British East Africa Administration's telegraph have been further reduced within the last year, and the distance to be covered before Cape Town and Cairo are joined by an unbroken line of telegraph has now been reduced to about 520 miles. The annual working expenditure of the line is not yet balanced by the revenue, and the deficiency continues, as before, to be advanced by the British South Africa Co. The deficit on the working of the line for the year covered by the accounts shows a considerable decrease compared with that of the previous year, and there will be a further decrease in the year 1908-9. It has been decided to raise the tariff rates for code and cypher messages by 50 per cent., that is to say, from 3d. a word to 4½d. a word. This has been rendered necessary by the general adoption of the five-letter combination codes, compiled to take full advantage of the new regulation with regard to the transmission as single words of any pronounceable combination of 10 letters—a regulation that increases the liability to errors in transmission and, in effect, reduces the number of code words transmitted. Mr. Rochfort Maguire and Mr. Sigmund Neumann retire from office, but offer themselves for re-election.

The sixth ordinary general meeting of the shareholders of this company was held on Monday at the offices, 2, London Wall Buildings, Mr. Rochfort Maguire in the chair.

In moving the adoption of the report, the CHAIRMAN said they would have learned that the line was being maintained in good working order, and that interruptions to traffic had been of short duration. On that point it was not necessary for him to say more than that, considering the length of the line and the unprotected nature of the country through which, for a great part, it passed, it was extremely satisfactory that the interruptions had been so few, and that the thefts of the wire, which were suggested as one of the chief difficulties of constructing the line, had also been extremely few. They would notice that the excess of working expenditure over revenue for the year dealt with in the accounts, was considerably less than that for the previous year, and there would be a further decrease for the year 1908-9. For the year 1905 the loss was £2,764, whilst for the current year it was not expected to exceed £1,500. That result was due to the economies which had been effected from time to time as the varying circumstances of the line had rendered them possible. It was to be regretted that it was due to that cause alone and not to any increase of revenue, for, as a matter of fact, between the years 1904 and 1908, the revenue had steadily diminished, and since that time it had been only stationary. To endeavour to increase in some small degree the revenue coming to them, it had been decided to raise the tariff rates for code and cypher messages by 50 per cent., and it was hoped that that would make a moderate increase in the revenue. This want of elasticity in their revenue led them to a further consideration—that the circumstances of a new country, such as the greater part of the line passed through, which was not in any real sense opened up to civilisation, and which had only a very small and gradually growing white population, did not afford a basis for rapidly developing telegraphic traffic, and it was to be feared that that consideration would apply with even greater force to the country which still remained to be traversed before the Cape to Cairo telegraph would be completed. In fact, their experience, which now extended over many years, showed them that telegraphic enterprise in a country situated as this was, did not afford a basis for profitable commercial enterprise, and that, coupled with the fact which he had more than once explained at such meetings, that the whole capital problem was completely altered since Mr. Rhodes initiated the enterprise, now 17 years ago, doubtless had weighed, and would weigh, with the Rhodes and Beit trustees in their consideration of the claims of the Cape to Cairo telegraph, as compared with other schemes of development claiming their assistance. Consequently he was not in a position to report any progress, since the last meeting, in the negotiations or hopes which they were then inclined to form of assistance to complete the remaining sections necessary to finish the line.

MR. BOURCHIER F. HAWKSLEY seconded the motion, and the report was adopted.

Victoria Falls and Transvaal Power Co., Ltd.

THE ordinary general meeting of the above company was held at Salisbury House, London Wall, on Friday, under the chairmanship of Mr. H. Birchenough, C.M.G.

The CHAIRMAN, in proposing the adoption of the report (see ELECTRICAL REVIEW, July 9th, page 69), said he had been asked to preside in the absence of Lord Winchester, who at the present time was on his way back from South Africa, where for the last few months he had been closely engaged upon their business. Great progress had been made during the year in establishing the business upon a solid and permanent basis. Since they last met, far-reaching developments had taken place. To deal with the balance-sheet on December 31st last, the issued capital of the company consisted of 1,801,050 shares, divided into 1,000,000 ordinary shares and 801,050 preference shares of £1 each. First mortgage debentures to the amount of £800,000 had been issued, and, in accordance with the wishes of the auditors, there had been added to this figure the interest and income-tax for the half-year to December 31st due, but not paid until January 1st, 1909. The amounts due to creditors in Europe and South Africa were for contract work certified, but not paid, at the date of balance-sheet, together with sundry merchants' accounts, natives' wages accounts, &c., all of which had since been paid. In this year's balance-sheet the heading "purchase of property and concessions" had been divided into "purchase of leases and undertakings" and "expenditure in connection with new stations." A total amount of £699,885 had now been expended upon new stations. As a considerable proportion of the time of the directors and staff had during this construction period been taken up with matters connected with the erection of plant, the board had felt justified in including a proportion of the management expenses in London and South Africa under this heading. The debts due to the company, amounting to £20,127, were all good, and had since been paid. Owing to the fact that they were again mainly occupied in construction work, and only supplied current from the old stations, a profit and loss account was not submitted. They would, however, see that after paying interest on the debentures allotted in part purchase of the Rand central station, and providing for general expenses and depreciation of stores, furniture and live stock, the account showed a surplus of £48,178, compared with a surplus last year of £36,686. This result was satisfactory, especially when it was remembered that their temporary contract for the bulk supply of electricity to the city of Johannesburg, expired in the middle of the year. The directors had not charged to the revenue and expenditure account anything for depreciation of the new works, as it was only towards the end of the year that the first units of the new plant were ready for commercial use. They had every reason to believe that the working of the year 1909 would show a satisfactory surplus, but it was too early to estimate with any degree of certainty what that surplus would be. They were still in the construction period, and under these circumstances they thought it wiser and more prudent not to pay any interim dividend upon the preference shares for the first six months of this year, but to ascertain their profits before they divided them. In the long run the preference shareholders would not suffer, as their dividends were cumulative. Since the meeting in October last, an immense change has taken place in the position and magnitude of the undertaking. Their business had developed from one of medium size and importance into one of the largest electrical power businesses in the world with an assured and, he might say, permanent connection. At the extraordinary meeting held in February they were told they had acquired from Mr. Harper a conditional agreement made by him with the Rand Mines, Ltd., under which, when the agreement became definite, 15 mining companies controlled by the Rand Mines and Eckstein Groups would

contract to take the whole of their power requirements from a company to be formed for the purpose of supplying them with electricity and compressed air. This agreement was originally for 12 years, but they were successful in negotiating an extension of the contract from 12 to 20 years—without any right on the part of the Rand Mines of terminating it at an earlier period. The annual power requirements of these mines were estimated by the Rand Mines, Ltd., at 270,000,000 units, and Lord Winchester spoke of this contract as being the largest contract for power ever placed with one company. In addition to this agreement, negotiations had been successfully carried out for the prolongation of the contract with the Consolidated Goldfields of South Africa from 10 years to 12 years, and important contracts had been entered into with other mining groups, including the Johannesburg Consolidated Investment Co. In order to take advantage of the Harper agreement it became necessary to raise additional capital. Accordingly an agreement was negotiated and entered into with the German banks for the subscription of £900,000 5 per cent. debentures, and subsequently, in accordance with arrangements made with the banks, a prospectus was prepared and £900,000 preference shares were issued in London. A company had been formed and registered in the Transvaal, entitled the Rand Mines Power Supply Co., Ltd., to operate the Eckstein contract and to supply power in bulk to their company. It had a capital of £1,500,000, namely, a share capital of £500,000 in shares of £1 each, and it would have borrowed capital of £1 000,000. The whole of these 500,000 shares were being subscribed at par by their company, and the borrowed capital would be advanced by their company. He wanted to make it quite clear to them that, while the Rand Mines Power Supply Co. was a separate and distinct company from the Victoria Falls and Transvaal Power Co., yet it had been called into existence by the Victoria Falls and Transvaal Power Co. for a specific purpose, and its entire capital was owned and held by the Victoria Falls and Transvaal Power Co. Proceeding to deal with the question of competition, which was threatened when the meeting was held last year, the chairman said that, thanks to negotiations, cut-throat competition, with its unnecessary duplication of plant and great economic waste, had been avoided, while the interests of the consumers of electric power had been effectively and amply safeguarded. The result was that their undertaking, which, a year ago, had a revenue of £160,000, with scope for increase up to £300,000, would have a revenue of £800,000 a year as soon as the machinery necessary for supplying the huge demand they had in sight was ready for commercial use. They had now a secured business, based upon long contracts. They had the active goodwill, and, in some cases, the powerful financial co-operation of the great mining groups, who saw in cheap electrical power a material element in their own prosperity and success. As a rule, in business, the difficulty was to find customers; in their case the immediate difficulty was to cope with the demands for power as they came in. Touching next on the strenuous work of Lord Winchester and the Committee, by whom the negotiations for the Eckstein and other contracts were carried through, the chairman said they had voted these gentlemen special remuneration, and the board had fixed the remuneration of Lord Winchester as chairman and member of the executive committee at £3,000 a year.

SIR CHARLES METCALFE, Bart., in seconding the motion, said he had recently visited their stations, and found everything working well and smoothly. He believed they had the finest up-to-date plant in the world. They had now something like 12,000 KW. in actual use, and would have double that amount in 12 months' time. The opposition to them appeared largely to have died away, and they were now looked upon as contributing to the general prosperity of the country.

Replying to a question by MR. WISDEN as to the generating of electricity at the Victoria Falls, SIR CHARLES METCALFE said that they had found the question of the transmission of power from the Victoria Falls an enormously difficult one, owing to the attitude of the people in the Transvaal, who supplied coal to various companies, and also of the railway authorities, who feared that they would lose a large amount of revenue if coal was not used. To meet that opposition they had had to defer the question of the long transmission for the present.

The report was then adopted, and the retiring directors were re-elected.

The recent annual report of this company evoked a complaint by the *Berliner Tageblatt* on the ground that it was only published in English. When the 5 per cent. loan of £625,000 was offered in Germany, the Berlin newspaper states that it was expressly declared in the prospectus that all announcements respecting the debentures, as well as the publication of the balance sheet and profit and loss account, would be effected in the *Reichsanzeiger*, and in two other Berlin newspapers, as long as a portion of the A loan was in circulation. It is therefore all the more astonishing, it is said, that the present report appears solely in English. It should have been the duty of the company, and of the interested German firms, it is considered, to take care that the report was also published in the German language, as the German market was drawn upon for very considerable sums, and the undertaking is still in course of development, so that German debenture holders have an extraordinary interest in being sufficiently informed of the position of the enterprise.

Liverpool Overhead Railway Co.—The accounts for the past half-year show an available balance of £7,696, and the directors have resolved to recommend payment of a dividend at the rate of 5 per cent. per annum on the (1892) preference shares, as last year, leaving a balance of £4,696 to be carried forward.

Central London Railway Co.

THE directors' report for the half-year ending June 30th, 1909, shows that, compared with the corresponding period in 1908, there has been a decrease of £19,646 in the revenue receipts and of £258 in the working expenses. The balance carried to net revenue is £64,139. After providing for interest on the debenture stock and other payments, as shown by the net revenue account, there remains a balance of £84,093. The directors recommend the declaration of dividends on the undivided ordinary stock at the rate of 3 per cent. per annum for the half-year, and on the preferred ordinary stock at the rate of 4 per cent. per annum for the half-year. Dividend on the deferred ordinary stock not being payable until the result of the working of the whole year is ascertained, the remaining balance of £44,750 is carried forward to next half-year. The number of passengers carried since the opening of the railway in 1900, including those using through tickets and the cheap return tickets, is 376,824,427. In the reports to the proprietors for the year 1908, attention was called to the satisfactory traffic derived from the Franco-British Exhibition at Shepherd's Bush. The Imperial International Exhibition was opened in May of the current year, but though it yields some additional traffic, the remarkable results of last year have not up to the present been repeated. The effect of the competition by horse and motor-omnibuses over the whole of the company's route, especially for short distances, has resulted in a material decrease in the number of passengers carried by the company's trains, and after careful inquiry and observation the directors decided in March last to adopt, in addition to the 2d. and 3d. fares, a fare of 1d. for passengers travelling not more than three stations from the station of departure. There has been a large increase in the number carried for short distances, but the experience has been too brief to permit of the expression of a decided opinion on the experiment. The decrease in the number of ordinary local passengers carried during the half-year was 1,515,633, as compared with the corresponding period, which, it must be remembered, included traffic to and from the Franco-British Exhibition. The number of workmen carried was 454,714 less, but the passengers exchanged with other companies' lines increased by 1,067,706, indicating the value of the through booking arrangements. The net decrease in the number of passengers carried was 912,641. The company's Bill for the extension of their line from the Bank to and under the Liverpool Street Station of the Great Eastern Co., with a connection to the adjacent Broad Street Station of the North London Co., has been passed by Committees of both Houses of Parliament. It now awaits the Royal Assent. The Bill also provides for exchange subways between the Holborn Station of the Great Northern, Piccadilly and Brompton Co. and the British Museum Station of the Central London Co., and between the public subway of the Central London Co.'s Bank Station and the booking hall of the City and South London Co.'s station in Lombard Street.

Crompton & Co., Ltd.

THE twenty-first annual general meeting of the shareholders of this company was held on Monday, at Salisbury House, London Wall, Mr. J. Trotter presiding.

The CHAIRMAN, in proposing the adoption of the report (see ELECTRICAL REVIEW, July 23rd, page 147), said he had no doubt that the net trading results for the past year would be considered unsatisfactory by the shareholders. The cause of that general depression in trade, he had little doubt, was to be found in the rapid growth of expenditure, not only in this country but abroad, especially expenditure of an unproductive kind. The large sums raised a few years ago by municipal authorities produced an unnatural demand for electrical appliances, with the inevitable result that many new works were established, resulting, now that the municipal expenditure had, to a great extent, ceased, in very unhealthy competition, and the reduction of prices to a level which, for the time being, left no room for reasonable profit. There were other causes at work of a far-reaching character which had had an effect upon our industries. One of them might be found in the reluctance of our Government to give support to industrial enterprise abroad, compared with the Canadian, American, the German and Russian Consuls in foreign countries, who were to all intents and purposes pioneer travellers in the interests of the industries of their respective countries. There were also abroad financial institutions of a semi-political character whose business it was to finance vast undertakings throughout the world. There was, for instance, the Victoria Falls Power Co.'s undertaking, involving an expenditure running into millions on electrical plant. There in one of the British Colonies the work was given to Germany, work which should go to a British company, but they could not possibly undertake that work for lack of that financial support, which was easily obtained by German companies from German industrial banks. Even for much smaller undertakings at home and abroad, there was a lack of financial support in London which could not properly be supplied by our present banks, and it left room for the establishment of a strong industrial bank, with able men at the head doing business on the lines of the Deutsche Bank in Germany. The result of the absence of those facilities was that electrical manufacturers and contractors were turning to company promoting on their own account—an unhealthy condition which invariably resulted sooner or later in the lock-up of capital which should be kept in a more liquid form. That was shown in their balance-sheet, but fortunately not to a very serious extent. They were obliged temporarily to hold investments in other companies, especially in the Electrical Supply Corporation—a thoroughly sound undertaking, making

satisfactory progress, but, as was always the case, involving a period of a few years for the business to become thoroughly established. Such a bank as he had indicated might safely invest in undertakings of that description with advantage to itself and with advantage to manufacturing concerns such as theirs, who should be in a position to use their capital for fresh undertakings as soon as the first installation was complete. There was another cause which, without doubt, prejudicially affected their own and other undertakings, and that was the general want of confidence which had been brought about by recent legislation. Slackness of trade had resulted, and capital which, if used in this country, might bring about a speedy revival, had gone abroad or to the Colonies. During the past six months there had been new issues on the London market which had been successfully placed to the following extent:—For the Colonies, 25 millions; foreign Governments, about 19 millions; foreign railways, 17 millions; Colonial and foreign corporations, 12 millions; Colonial and Indian railways, 7 millions; or 81 millions in all. It was true that a portion of that vast sum might be spent in the purchase of goods in this country for shipment abroad, but even so the money went over seas, and it must follow that this country was not benefited to anything like the extent it would be if the greater part of the money were used in this country. If they took the last four years, including the present one, they would find that there had been an average profit of about £25,000. The previous four years, which also included a bad year like the present one, showed an average profit of £16,500; they would therefore see that the business was making a genuine advance. The secret of the bad result obtained in the present year was to be found in the diminished gross profit. The gross profit was reduced to some extent by a slight falling off in the turnover, yet the turnover had only twice been surpassed in the history of the company. The actual gross profit on the turnover was 3 per cent. less than on the turnover of the previous year. There seemed no apparent reason why prices should rise materially in the immediate future, and the only way of making a profit in these times was to use every effort to increase, as well as to improve, the business, and consequently still further reduce the cost of production. The general manager and the staff had during the year given their attention to the question of the manufacture and sale of machinery and apparatus on which there might be a larger margin of profit than could be obtained from the sale of standard manufactures, in which there was so much competition. They did not limit themselves to the manufacture of electrical apparatus only, but had looked further afield, and were turning out some non-electrical apparatus suitable to their existing machine tools and appliances. The company's designers had been exceedingly busy during the year, and several new patents had been taken out, the most important of which were a series covering the auto-converter. One of the most important fields open to the auto-converter was its application to the control of electrical vehicles—for example, omnibuses and tramcars. An omnibus had been equipped, and had already run over 1,500 miles, with results that amply justified the high opinion formed of the invention. He was happy to say that they still secured a considerable amount of Government work, and within the last few days had secured an important contract of that description, in face of international competition. During the year foreign competition had again made itself felt, particularly with alternating-current machinery. It was disappointing to find that many large manufacturing concerns in this country would as readily purchase foreign as British made machinery, although the prices were the same. One feature which had hampered business during the year had been the large amount of the company's capital locked up in retention moneys. That feature was reflected in the item of trade debtors which had gone up some £30,000, and correspondingly loans from banks had increased temporarily. Then again there was a considerable amount of capital locked up in the Electrical Supply Corporation. In the meantime it had been desirable to find temporarily a certain amount of capital, and with that object the directors offered to the shareholders an issue of short term notes. They were still open to dispose of some more of those notes, but in the event of their not being applied for, they had made such arrangements as would fully meet all their financial requirements. Turning to the balance-sheet the item of plant and tools was reduced by nearly £31,000. The stock also had been slightly reduced. Investments in other companies showed an increase of £10,000. Trade debtors were up by some £30,000, a large portion of which was due to retention money, much of which should have been realised before now, but for unforseen circumstances beyond their control. The reserve fund stood at £28,000, instead of £20,000 last year. The gross profit was reduced by £23,000, and the net profit to revenue account was only £10,000, in place of £31,000. The result of the year's trade was that they had paid their way, but were unfortunately not able to pay any dividend to the shareholders.

Col. Crompton, in seconding the resolution, said that as he was the largest shareholder, he was hit far harder than anybody else, and he could tell them that this bad year was a very great blow, but he could say that he was not cast down. He thought that the future was still bright, for they had the best of all assets, a very good staff of engineers, and experts on whom they could depend, and none of whom were leaving them. He did not consider it was necessary to say anything in apology for an honest balance-sheet produced by honest work, by thoroughly capable engineers, and he believed that they had the best engineers in the kingdom.

The report was adopted.

Liverpool District Lighting Co. — The directors announce an interim dividend at the rate of 4 per cent. per annum, less income-tax. Last year the rate was 5 per cent.

Anglo-American Telegraph Co., Ltd.—The directors' report states that the total receipts from January 1st to June 30th, 1909, including the balance of £1,565 brought forward from the last account, amounted to £211,760. The traffic receipts show an increase of £14,503 as compared with the half-year ended June 30th, 1908. The working expenses of the half-year, as shown by the revenue account, amounted to £72,345, being a decrease of £950 as compared with the corresponding period of 1908. The directors, under the powers conferred upon them by the Articles of Association, have, before declaring the net profits, set apart the sum of £10,000 to the renewal fund, leaving a balance of £129,414.

Quarterly interim dividends of 15s. per cent. on the ordinary stock and £1 10s. per cent. on the preferred stock were paid on May 1st, 1909, absorbing £52,500, and second quarterly interim dividends of 15s. per cent. on the ordinary stock and £1 10s. per cent. on the preferred stock, amounting to £52,500, will be paid on July 31st, 1909, as in the previous year. The balance of £24,414 will be carried forward.

Stratford-on-Avon Electricity Co., Ltd. — The directors, in their second annual report, state that, although the profits do not at present justify the declaration of a dividend, they are well satisfied with the rapid progress that is being made. Mr. S. Paterson retires and does not seek re-election, but the board recommends the election of Mr. John MacGregor, managing director of Messrs. Johnson & Phillips, Ltd., in his place. The accounts show gross receipts amounting to £886, and a balance to net revenue of £216, which suffices to meet interest on debentures and bank charges, leaving a balance carried down of £75.

Anglo-Argentine Tramways Co., Ltd.—At an extraordinary general meeting of the proprietors, a resolution passed at the extraordinary general meeting held on July 7th, approving the new regulations of the company to the exclusion of and in substitution for all existing regulations, was agreed to unanimously. The chairman announced that the board had considered the suggestions made with regard to the issue of bearer shares, and that, in consultation with their Continental friends, facilities would be given to meet the wishes of the proprietors in that respect.

Kensington and Knightsbridge Electric Lighting Co., Ltd.—The directors have declared an interim dividend on the ordinary shares for the half-year ending June 30th, 1909, at the rate of 8 per cent. per annum, payable on August 12th. Last year the rate was the same.

The National Gas Engine Co., Ltd.—The directors have resolved to pay an interim dividend at the rate of 5½ per cent. per annum, less income-tax, on preference shares, and 20 per cent. per annum, less income-tax, on ordinary shares, for the six months ended June 30th, 1909. Dividend warrants will be posted to shareholders on the 31st inst. in respect of all shares standing in their names on the 23rd inst. Last year the rates were the same.

Melbourne Tramway and Omnibus Co., Ltd.—The London secretary has received cable advice of the declaration of a bonus for the year ended June 30th last at the rate of 5 per cent., as in the previous year, payable on August 10th.

Bournemouth and Poole Electricity Co., Ltd.—The interim dividends upon the 4½ per cent. preference shares and the 6 per cent. second preference shares, less income-tax, for the half-year to June 30th, and an interim dividend on the ordinary shares at the rate of 5 per cent. per annum, less income-tax, for the same period, as in the previous year, all payable on August 15th, are announced.

Rees Roturbo Development Syndicate, Ltd.—The report states that during the six months to June 30th the rate of progress shown in the earlier reports of the syndicate has been fully maintained. The royalties for the half-year amount to £1,108, as against £608 for the corresponding period of last year. The directors have decided to pay an interim dividend at the rate of 5 per cent. per annum, which, less income-tax, will absorb £709.

Brompton and Kensington Electricity Supply Co., Ltd.—The directors have declared an interim dividend for the half-year to June 30th on the ordinary shares at the rate of 9 per cent. per annum, the same rate as last year.

City of Buenos Ayres Tramways Co. (1904), Ltd.—The directors have declared a dividend of 1s. 3d. per share, less income-tax, for the three months ended June 30th last (as last year).

Vickers, Sons & Maxim, Ltd.—The directors announce the following interim dividends for the half-year ended June 30th last: 2½ per cent. (less income-tax) on the preferred 5 per cent. stock and 5 per cent. preference shares, and 1s. per share (free of income-tax) on the ordinary shares.

Continental Notes.—La Compagnie Egyptienne Thomson-Houston, of Brussels, reports a profit of £4,057 for the last financial year.

Messrs. Brown, Boveri & Co., of Baden, are declaring a dividend of 11 per cent. for the last financial year, the same as for the preceding 12 months.

Imperial Tramways Co.—It is announced that no interim dividend will be paid at this time on either class of shares.

ELECTRIC TRAMWAY AND RAILWAY TRAFFIC RETURNS.

Locality.	Fortnight ended.	Receipts for the fortnight. £	£*	No. of wks.	Total to date. £	£*	Route miles open.	Inc.
Aberdeen	July 21	3,847	+ 18	7	11,011	— 208	..	..
Ayr	,, 24	1,343	— 5	10	3,805	— 171	8	..
Bath	,, 21	1,978	+ 283	29	21,274	+ 898	..	..
Belfast	,, 23	8,248	+ 987	16	63,311	+ 2,771	37	..
Birkenhead	,, 25	2,177	— 44	16	17,811	— 457	13·52	..
Birmingham Corp.	,, 17	15,398	+2,532	16	103,927	+ 3,182	..	..
Blackburn	,, 21	2,252	— 151	17	19,357	— 628	13·97	..
Blackpool-Fleetw'd	,, 24	2,086	— 111	3	3,666	— 128	..	..
Bolton	,, 18	4,781	+ 163	16	37,537	— 531	26	..
Bournemouth	,, 21	3,332	— 95	16	26,559	— 23	21·96	..
Bradford	,, 17	9,903	+ 440	15	76,712	+ 1,371	54·9	..
Brighton	,, 25	2,035	+ 34	17	15,910	+ 768	9·5	..
Bristol	,, 23	11,772	+ 810	..	..	..	..	..
Brit. Elec. Trac. Co.								
Airdrie	,, 16	455	— 16	28	6,096	— 144	3·65	..
Barnsley	,, 16	328	— 22	,,	4,640	— 204	..	..
Barrow	,, 16	517	— 34	,,	6,159	— 481	5·37	..
Cavehill	,, 16	306	+ 78	,,	2,311	— 174	..	..
Devonport	,, 16	716	— 177	,,	10,189	— 2,303	8·85	..
Gateshead	,, 16	2,017	— 23	,,	27,674	— 817	11 25	..
Gravesend	,, 16	470	+ 5	,,	5,521	— 219	6·5	..
Greenock	,, 16	1,028	+ 37	,,	14,569	+ 192	7·25	..
Hartlepool	,, 16	556	+ 9	,,	6,201	— 160	6·72	..
Kidderminster	,, 16	279	— 20	,,	2,752	— 202	..	..
Leamington	,, 16	419	+ 21	,,	4,581	+ 163	..	..
Merthyr	,, 16	466	+ 34	,,	5,905	+ 55	2·9	..
Metropolitan	,, 16	13,742	+1,518	,,	167,030	+13,444	22	..
Middleton	,, 16	729	— 28	,,	9,263	— 709	8·5	..
Mid. Joint Com'tee	,, 16	13,796	+1,978	,,	217,441	— 2,094	..	..
Oldham—Ashton	,, 16	1,168	— 27	,,	15,498	— 1,028	9·13	..
Peterborough	,, 16	352	— 26	,,	3,161	— 280	5·31	..
Potteries	,, 16	3,605	+ 43	,,	49,446	— 1,246	29	..
Rothesay	,, 16	832	+ 32	,,	4 113	— 70	2·75	..
Southport	,, 16	698	— 12	,,	7,620	— 248	8·17	..
S. Metropolitan	,, 16	1,744	+ 68	,,	21,245	— 313	..	..
Swansea	,, 16	2,031	+ 50	,,	25,872	+ 488	12·5	..
Tynemouth	,, 16	771	+ 165	,,	5,615	+ 46	3·75	..
Weston-s-Mare	,, 16	555	+ 26	,,	2,792	+ 165	3	..
†Worcester	,, 16	634	— 5	,,	7,331	— 128	5·75	..
Wrexham	,, 16	200	— 10	,,	2,763	— 123	..	..
Yorks. Wool. Dist.	,, 16	1,824	+ 69	,,	24,724	— 505	17	..
Miscellaneous	,, 16	454	+ 26	,,	5,536	— 4	..	..
Burnley	,, 24	2,441	— 280	..	..	..	..	..
Burton-on-Trent	,, 25	553	— 88	17	4,461	— 134	6·61	..
†Bury	,, 18	1,188	— 60	15½	18,864	— 521	23·5	..
Cardiff	,, 17	4,484	— 99	16	33,909	— 1,003	..	..
Carlisle	,, 24	374	— 47	29	4,708	— 188	..	..
Chatham and Dist.	,, 22	1,888	+ 303	29	24,644	+ 1,946	14·98	·61
Cork	,, 22	1,118	+ 73	29	12,245	— 554	..	..
Croydon	,, 16	3,016	+ 182	..	23,112	+ 68	11·25	4·75
Darlington	,, 24	374	— 38	17	3,182	— 199	..	..
Darwen	,, 18	528	— 13	15	3,929	— 159	4·86	..
Dover	,, 17	455	— 140	16	3,168	— 346	4·75	..
†Dublin	,, 16	5,682	+ 247	..	13,002	— 86	54·25	..
Dundee	,, 21	2,351	— 96	9¼	11,113	— 458	15	..
East Ham	,, 24	2,193	+ 487	16½	16,984	+ 2,305	8·43	·68
Exeter	,, 23	687	— 14	17	5,871	+ 544	5·5	..
Glasgow	,, 24	30,044	—1,402	..	130,672	— 4,425	90·5	1·5
Hastings	,, 22	2,320	+ 26	..	..	..	..	..
Huddersfield	.. ..	..	..	..	..	..	..	..
Hull	,, 24	4,997	— 21	16	40,998	+ 403	13	..
Ilkeston	,, 21	276	— 23	16	2,149	— 73	..	..
Ipswich	,, 24	946	+ 29	17	6,636	+ 15	10·5	..
Kilmarnock	,, 24	320	— 7	10	1,512	— 79	4·25	..
†Lan'kshire Trm. Co.	,, 22	3,035	+ 113	29	36,202	— 1,697	17 62	1·18
Lancashire United	,, 21	2,688	— 129	29	37,492	+ 110	..	..
Leeds	,, 17	14,157	—2,593	16	103,716	+ 801	96·75	·25
†Leicester	,, 17	2,161	— 129	..	..	..	..	..
†Leith	,, 10	708	+ 103	8	5,028	+ 419	6	..
Liverpool	,, 17	22,765	+ 569	28½	300,206	— 3,047	104	..
†L.C.C.	,, 10	73,116	— 718	..	522,776	+18,397	121	4·25
London United	,, 24	14,055	—1,012	..	172,148	—16,569	..	..
Lowestoft	,, 24	480	— 85	43	6,585	— 785	3·5	..
†Manchester	,, 17	15,218	— 284	16	237,119	— 625	90·5	6
Newcastle	,, 24	7,548	..	..	65,871	+ 1,425	..	..
Newport	,, 24	1,286	— 80	17	11,202	— 341	14·5	..
Oldham	,, 25	3,738	— 403	17	33,259	— 2,230	23·75	..
Pontypridd	,, 17	756	+ 54	15½	6,614	+ 1,058	6·5	1·75
Portsmouth	.. ..	..	..	..	..	..	..	..
†Preston	,, 14	748	— 29	..	..	..	..	..
Rotherham	,, 22	1,095	— 92	16	9,722	— 324	10	·66
Salford	,, 19	9,678	— 737	15⅝	73,677	— 2,192	..	..
Sheffield	,, 27	11,281	+ 6	17½	98,836	— 1,296	37	1·25
Southampton	,, 21	2,268	— 22	16	17,082	— 444	..	..
Southend-on-Sea	,, 21	1,581	+ 510	16	8,290	+ 1,488	..	..
†South Shields	,, 17	604	— 4	15⅞	8,785	+ 37	..	..
Swindon	,, 7	260	— 52	..	..	..	..	..
Tynesides	,, 21	959	+ 119	3	1,420	+ 151	..	..
Wallasey	,, 17	2,073	+ 156	15½	14,742	+ 510	..	·22
Walthamstow	,, 10	1,242	— 109	15	9,992	+ 161	9	..
West Ham	,, 15	4,428	+ 429	15	36,151	+ 2,161	15	·3
Wolverhampton	,, 21	1,749	+ 6	16	13,161	+ 776	12·5	..
Baker St.-Waterloo	,, 24	6.170	+ 150	3	9,535	+ 425	4·25	..
Cen. London Rly.	,, 24	10,721	—4,867	3	16,329	— 6,474	6·32	·55
Char. +, Eus. Hamp.	,, 24	7,830	+1,315	3	11,820	+ 2,000	7.75	..
City & S. Lon. Rly.	,, 25	6,051	+ 633	3	9,259	+ 637	7·2	..
Dublin-Lucan Rly.	,, 23	318	— 19	3	506	+ 6	7	..
G.N. and City Rly.	,, 24	2,604	+ 57	3	3,939	— 24	3·6	..
G.N., P'y. & Brmin.	,, 24	10,760	+ 255	3	16,435	+ 510	9·25	..
L'pool Overh'd Rly.	,, 25	2,844	— 121	3	5,806	— 43	6·8	4·3
Llandudno-Col. Bay	,, 28	1,154	+ 25	34	7,010	+ 1,636	..	..
Mersey Railway	,, 24	3,858	+ 193	3	5,788	+ 295	4·5	..
Metropolitan Rly.	,, 25	33,044	+ 662	3	49,828	+ 1,010	24·5	..
Met. District Rly.	,, 24	21,082	+2,369	3	31,330	+ 3,285	24	..
Anglo-Argentine	,, 22	73,620	+5,909	29	1,132,606	+65,520	..	..
§Auckland	,, 16	18,418	+1,508	28	96,514	+13,296	22·3	3·1
Bombay (B.E.T.)	June 24	4,922	+ 316	24	68,646	+ 2,720	..	..
§Brisbane	,,	15,480	+2,120	..	..	..	..	..
§Brit. Columbia Rly.	,,	41,365	+8,826	..	..	..	..	..
Calcutta	July 24	6,719	+ 631	..	..	..	..	..
§Cape Electric T. Ld.	June	11,208	..	..	..	..	..	..
§Kalgoorlie, W.A.	,,	4,008	..	26	22,629	..	20·5	..
Madras	July 15	1,922	+ 61	28	16,686	+ 114	..	..
§Melbourne	.. ..	..	..	..	..	..	..	..
§Lisbon	.. ..	..	..	..	..	..	..	..
Perth (W.A.)	July 23	2,653	— 97	29	41,376	— 55	28	2·4

* Compared with the corresponding period of 1908. † One week only.
‡ Includes horse, steam and other receipts. § One month.

STOCKS AND SHARES.

Tuesday Afternoon.

The rush of new prospectuses is the sign that the holiday closure upon Stock Exchange business is about to be moved, August being a particularly dead month for fresh issues. Activity in the markets is dying quietly, and the Home Railway dividends, while they have stirred up rather more animation than is usual in this department, do not seem able to create much additional business. There is greater interest taken in the Test Match, Channel flights, Goodwood racing, and the August time-tables, than in stocks and shares.

Amongst the few really interesting markets are those in copper—the metal, and copper shares. A remarkable position exists, in which copper prices are gaily rising, while the trade statistics are distinctly adverse to the movement. According to expert accounts, there is plenty of supply and no unusual demand, yet the American division which has the market in hand continues to drive prices up in a manner which mystifies the outsider who has not experienced the ways of Wall Street when financiering is on foot.

In the Stock Exchange the price of copper appears to be generally considered indefensibly high; but, at the same time, the impression prevails that it may be put up further still if it suits the manipulators to continue their buying.

Up to the present, the movements in copper and in rubber—which last is also standing exceedingly high—have had little or no effect upon the prices of electrical stocks and shares, cable or otherwise. Telegraph Constructions are £1 up this week, and both Callender's and Henley's shares are substantially better. In the case of the last two, the Debenture issues, as well as the shares, have risen, and the advances came, curiously enough, almost simultaneously.

British Aluminium Ordinary are the turn harder, and General Electric Preference gained 5s. Other manufacturing varieties are quiet. Armament shares picked up on the Government announcement of the additional ships that are to be laid down. Rubber shares display a good deal of strength, and while it is undeniable that prices now stand at very high levels, reaction can hardly be expected so long as the product itself is in such keen demand at rising figures.

Home Railway dividends make a distinctly creditable showing up to the present, and there is reasonable ground for hoping that the coal strike may be averted. Prices in this department are accordingly firm as a whole, but the strength is oozing out of Districts after their recent rises, and the Ordinary is ¼ lower, Metropolitans having gained a similar fraction, although the Surplus Lands stock shed a point. Central Londons are quite unmoved by the dividend declaration, which turned out to be pretty much what the market anticipated. Holders of the stocks are more concerned with the prospects for improved attendance at the Exhibition, but even the Queen's patronage does not suffice to draw great crowds to Shepherd's Bush this season.

London United Tramways Debenture stock has again risen 2 points, and there is a certain amount of business being done in the Preference shares between 2¼ and 2½.

Irregularity characterises the Canadian-Mexican group. Canadian General Electric rose 3½, and the Preferred advanced to 117, but Mexico Trams are several points lower, and Rio Trams fell 1 to 89, while Sao Paulos stayed at 105½. Mexican Light and Power Common shed a point, yet the Preferred stock and the bonds are harder. British Columbia Electric Railway descriptions are nominally without change, the 6 per cent. dividend on the Preferred having been regarded as a foregone conclusion. The Anglo-Argentine Tramways issues are steady. Calcutta Trams improved ½. British Electric Tractions have not moved, but Potteries Ordinary at 5s. are a trifle easier.

Charing Cross and Strand Electricity Supply shares have hardened, and County of London Preference rose ¼. For the new First Debenture stock 2 premium is bid, but this we regard as too low a price for so sound a security, which has every prospect of rising to, at all events, 4 or 5 premium when the stock settles down into the hands of permanent holders. Metropolitan Preference rose a small fraction. Urban Preference lost 2s. 6d., and the Debenture stock has been marked down to 81.

The Telegraph list, after its shaking by the Imperial journalists' demand for cheaper cable rates, is beginning to regain its equilibrium and its prices. A good number of small rises are scattered down the column, the Anglo-American group being most favoured. The improvement embraces telephone stocks and shares, but it failed to prevent a decline in Marconi's, where the Ordinary and Preference are both ⅛ down.

SHARE LIST OF ELECTRICAL COMPANIES.

TELEGRAPH AND TELEPHONE COMPANIES.

Present Issue.	NAME.	Stock or Share. *	Dividends for the last four years. 1906.	1906.	1907.	1908.	Closing Quotations July 20th.	Closing Quotations July 27th.	Business done week ended July 27th, 1909. Highest.	Lowest.	Rise + or Fall —	Present Yield per cent. £ s. d.
25,000	Amazon Telegraph Co.'s shares, Nos. 1 to 25,000	10	Nil	Nil	Nil	Nil	2⅜ – 3⅛	2⅜ – 3⅛	60/-	57/6	..	Nil.
196,700	Do. do. 5 % Debs., Nos. 1 to 1,350 Red.	100	5 %	5 %	5 %	5 %	92 – 96	92 – 96	..	..	..	5 4 2
$131,561,400	American Telephone & Telegraph, Cap. Stock ..	$100	7½%	8 %	8 %	8 %	149¼–144¼	143⅜–144¼	..	..	..	5 10 9
$53,000,000	Do. Collat. Trust, 4% Bonds, 1 to 28,000 and 53,001 to 78,000	$1000	4 %	4 %	4 %	4 %	97 – 99	97 – 99	97⅞	..	..	4 0 10
558,460	Anglo-American Telegraph	Stock	3½%	3½%	3½%	£3 4s.	58 – 60	58¼ – 60¼	58½	..	+ ½	5 5 7
3,220,770	Do. do. 5 % Pref.	Stock	6 %	6 %	6 %	6 %	101½–102½	102¼–103¼	103	102	+1	5 15 11
3,220,770	Do. do. do. Deferred	Stock	1%	12%	1 %	8/-	16⅞ – 17	17⅛ – 17½	17 7/16	16⅞	+ ⅛	1 11 2
47,725	Anglo-Portuguese Tel., 5 % Mort. Deb. Stock Red.	100	5 %	5 %	5 %	5 %	102¼–104½	103 –105	..	..	+ ½	4 15 3
44,000	Chili Telephone, Nos. 1 to 44,000	5	8 %	8 %	8 %	..	8 – 8⅛	8¼ – 8½	8⅜	8 11/16	+ ⅛	4 14 1
2,431,350	Commercial Cable, Stlng. 500 year 4% Deb. Stk. Red.	Stock	4 %	4 %	4 %	4 %	89 – 91	89 – 91	..	..	..	4 7 11
16,000	Cuba Telegraph	10	5 %	5 %	6 %	6 %	8¼ – 8⅞	8¼ – 8¾	..	..	..	6 15 6
6,000	Do. 10 % Pref.	10	10 %	10 %	10 %	10 %	17 – 18	17 – 18	..	..	..	5 11 1
12,981	Direct Spanish Telegraph, Ord.	5	4 %	4 %	4 %	4 %	2⅞ – 3⅛	2⅞ – 3⅛	..	..	..	5 3 8
6,000	Do. do. 10 % Cum. Pref. ..	5	10 %	10 %	10 %	10 %	8⅜ – 8¾	8⅜ – 8¾	..	..	..	5 12 8
80,000	Do. do. 4½ % Debs.	50	4½%	4½%	4½%	4½%	99 –101	99 –101	..	..	..	5 16 8
60,710	Direct United States Cable	20	4½%	4½%	4½%	4½%	12⅜ – 13⅛	12⅜ – 13⅛	13⅛	13	+ ⅛	6 7 5
43,500	Direct W. India Cable, 4½ % Reg. Deb., 1 to 1,300, R.	100	4½%	4½%	4½%	4½%	99 –101	99 –101	..	..	..	4 9 1
4,000,000	Eastern Telegraph, Ord. Stock..	Stock	7 %	7 %	7 %	7 %	125 –128 xd	125 –128	126½	125½	..	5 7 8
2,000,000	Do. 8½ % Pref. Stock..	100	8½%	8½%	8½%	8½%	84½– 86½ xd	84½– 86½	86	85	..	4 0 0
1,896,706	Do. 4 % Mort. Deb. Stock. Red. ..	Stock	4 %	4 %	4 %	4 %	104½–106½	104½–106½	106	..	..	3 15 2
800,000	Eastern Extension, Australasia, and China Tele	10	7 %	7 %	7 %	7 %	11¼ – 11½	11½ – 12	11⅝	11½	..	5 19 2
752,400	Do. 4 % Deb. Stock	Stock	4 %	4 %	4 %	4 %	103½–105½	104 –106	105½	..	+ ½	3 15 6
200,000‡	East. & S. Afric. Tel., 4 % Mtg Db. Mauritius Sub.) 1 to 8,000	25	4 %	4 %	4 %	4 %	100 –102	100 –102	100	..	..	3 18 5
181,127	Globe Telegraph and Trust	10	5⅛%	5⅛%	5⅛%	5⅛%	10½– 10⅞	10½– 10⅞	10 5/8	..	..	5 7 0
181,127	Do. do. 6 % Pref..	10	6 %	6 %	6 %	6 %	13½– 13⅞	13½– 13⅞	13 5/8	..	..	4 7 3
150,000	Great Northern Telegraph, of Copenhagen.. ..	10	24%	20 %	20 %	18 %	25⅞ – 26½	26 – 27	26½	..	+ ½	6 13 4
10,000	Halifax and Bermudas Cable, 4½ % 1st Mort. Debs., within Nos. 1 to 1,200, Red.	100	4½%	4½%	4½%	4½%	99 –101	99 –101	99½	..	..	4 9 1
17,000	Indo-European Telegraph	25	13 %	13 %	13 %	13 %	51½– 53½	51½– 53½	53	..	..	6 1 6
$41,380,400	Mackay Companies Common	$100	2 %	3½%	4 %	4 %	80 – 84	80 – 84	..	..	..	4 15 3
$50,000,000	Do. do. 4% Cum. Pref.	$100	4 %	4 %	4 %	4 %	74 – 79	74 – 79	..	..	..	5 5 3
894,190	Marconi's Wireless Telegraph	1	Nil	Nil	Nil	Nil	1⅛ – 1⅜	1⅛ – 1⅜	..	..	..	Nil
72,680	Monte Video Telephone Co., Ltd. Ord.	1	5 %	6 %	6 %	6 %	⅜ – ½	⅜ – ½	16/3	15,7½	— 1/16	6 0 7
86,492	Do. do. do. 5 % Pref. ..	1	5 %	5 %	5 %	5 %	⅜ – ½	⅜ – ½	..	..	— 1/16	5 13 3
2,225,000	National Telephone, Pref. Stock	100	6 %	6 %	6 %	6 %	108½–110	109 - 110½	109½	108½	+ ½	5 8 7
3,725,000	Do. do. Def. Stock	100	5 %	5 %	6 %	6 %	125½–127½	125½–127½	126½	126	..	4 14 1
15,000	Do. do. 6 % Cum. 1st. Pref.	10	6 %	6 %	6 %	6 %	10½– 11	10½– 11	..	..	..	5 9 1
15,000	Do. do. 6 % Cum. 2nd Pref.	10	6 %	6 %	6 %	6 %	10½– 11	10½– 11	..	..	..	5 9 1
250,000	Do. do. 5 % Non-cum. 3rd P., 1 to 250,000	5	5 %	5 %	5 %	5 %	5⅛– 5⅞	5⅛– 5⅞	5⅝	5 5/8	..	4 5 1
4,000,000	Do. do. 3½ % Deb. Stock Red. ..	Stock	3½%	3½%	3½%	3½%	97 – 99	97 – 99	97⅝	..	..	3 12 2
1,983,593	Do. do. 4 % Deb. Stock Red.	100	4 %	4 %	4 %	4 %	99 –101	99 –101	100½	..	..	3 19 3
179,813	Oriental Telep. and Elec. 1 to 171,504, fully paid ..	1	7 %	7 %	8 %	8 %	1 5/16 – 1 7/16	1 5/16 – 1 7/16	..	..	..	5 6 8
50,000	Do. do. do. 6 % Cum. Pref... ..	1	6 %	6 %	6 %	6 %	1 – 1⅛	1 5/16 – 1 7/16	22/6	..	..	5 8 0
99,100	Do. do. do. 4 % Red. Deb. Stock ..	100	4 %	4 %	4 %	4 %	85 – 87	85½ – 87½	..	..	+ ½	4 11 5
99,400	Pacific & European Tel., 4 % Guar. Debs., 1 to 1,000	10	4 %	4 %	4 %	4 %	99 –101	99 –101	..	..	..	3 19 3
11.889‡	Reuter's	8	5 %	5 %	5 %	5 %	7⅜ – 8⅛	7⅜ – 8⅛	..	..	..	4 18 9
145,955	Telephone Co. of Egypt, 4½ % Deb. Red.	100	4½%	4½%	4½%	4½%	98¾–100¾	99 –101	..	..	+ ½	4 9 1
3,042	Submarine Cables Trust	Cert.	6 %	6 %	6 %	6 %	129 –132	130 –133	..	..	+1	4 12 4
120,000	United River Plate Telephone	5	8 %	8 %	8 %	..	6⅞ – 7⅛	7⅛ – 7⅜	7⅛	7 3/8	+ ⅛	5 8 6
40,000	Do. 5 % Cum. Pref., Nos. 1 to 40,000	5	5 %	5 %	5 %	5 %	5 – 5⅛	5⅛ – 5⅜	5⅛	5 3/8	+ ⅛	4 10 8
80,008	W. Coast of America, 1 to 80,000 & 53,001 to 58,008	2½	Nil	2½%	2½%	..	1⅜ – 1⅝	1⅜ – 1⅝	..	..	..	4 10 11
150,000	Do. 4 % Debs., 1 to 1,500 guar. by Bras. Sub. Tel.	100	4 %	4 %	4 %	4 %	99 –101	99 –101	..	..	..	3 19 3
207,980	Western Telegraph, Ltd., Nos. 1 to 207,980.. ..	10	7 %	7 %	7 %	..	13½– 14	13½– 14	13⅝	13½	..	5 0 6
800,000	Do. do. 4 % Deb. Stock Red. ..	100	4 %	4 %	4 %	4 %	101½–103½	102½–104½	102½	102	+1	3 16 7
68,821	West India and Panama Telegraph	10	Nil	Nil	Nil	Nil	⅛ – ¼	⅛ – ¼	..	..	..	Nil
84,568	Do. do. 6 % Cum. 1st Pref.	10	6 %	6 %	6 %	6 %	8¼ – 8½	8 – 8¼	8¼	8¼	— ¼	7 1 2
4,669	Do. do. 6 % Cum. 2nd Pref.	10	Nil	Nil	£3 6	15 %	8 – 9	8 – 9	..	..	..	17 2 4
80,000‡	Do. do. 5 % Debs., Nos. 1 to 1,800 ..	100	5 %	5 %	5 %	5 %	100½–102½	101 –103	101	..	+ ½	4 17 1

ELECTRICAL RAILWAY, MANUFACTURING AND INDUSTRIAL COMPANIES.

330,000	Anglo-Argentine Trams, 10 % Nom. Cum. 2nd Pref., 260,008 to 330,007	5	8 %	8 %	9 %	10 %	9 7/16 – 9 7/16	9¼ – 9½	9⅜	9¼	+ 1/16	5 5 3
978,230	Do. 4 % Deb. Stock	..	..	..	..	..	90⅜ – 91½	90⅜ – 91½	91⅜	90⅞	..	4 6 6
332,387	Auckland E. Trams, 5 % 1st Mort. Deb. Stock ..	100	5 %	5 %	5 %	5 %	101 –103	101 –103	..	..	..	4 17 1
880,000	Babcock & Wilcox, 1 to 880,000	1	20 %	20 %	20 %	20 %	4⅛ – 4⅜	4⅛ – 4⅜	88/10½	86/8	..	4 11 1
100,000	Do. do. 6 % Cum. Pref., 1 to 100,000 ..	1	6 %	6 %	6 %	6 %	1⅜ – 1½	1⅜ – 1½	..	..	..	4 0 0
60,000	British Aluminium, Ord., 1 to 40,000	5	7 %	7 %	7 %	7 %	⅜ – ½	⅜ – ½	..	..	+ ⅛	48 0 0
60,000	Do. do. 7 % Cum. Pref.	5	7 %	7 %	7 %	7 %	1½ – 1⅝	1½ – 1⅝	..	..	..	43 2 1
40,100	Do. do. "A" 6 % Cum. Pref.	5	6 %	6 %	6 %	6 %	3 – 3⅛	3 – 3⅛	..	..	..	8 11 5
12,897	Do. do. 4 % Funding Certs.	5	4 %	4 %	4 %	4 %	2⅛ – 3⅛	2⅛ – 3⅛	..	..	..	5 14 3
124,400	Do. do. 5½ % Loch Leven Debs. ..	100	..	5½%	5½%	5½%	94 – 99	94 – 99	..	..	..	5 11 1
500,000	British Columbia E. Rail Def. Ord. Stock	100	6 %	6 %	8 %	8 %	143 –147	143 –147	147	146	..	5 9 7
400,000	Do. Pref. Ord. Stock	100	5 %	5 %	5 %	6 %	122 –126	122 –126	..	..	..	4 15 3
400,000	Do. 5 % Cum. Perp. Pref. Stock	100	5 %	5 %	5 %	5 %	107 –110 xd	107 –110	109	108½	..	4 10 11
238 000	Do. 4½ % 1st Mort. Debs., 1 to 6,250	40	4½%	4½%	4½%	4½%	102 –104	102 –104	102⅝	102½	..	4 6 7
212,600	Do. 4½ % Vancouver Power Debs., 1 to 2,300	100	4½%	4½%	4½%	4½%	101 –104 xd	101 –104	103	..	..	4 6 7
183,301	British Electric Traction	10	3 %	Nil	Nil	Nil	⅛ – ¼	⅛ – ¼	..	..	..	Nil
161,487	Do. do. 6 % Cum. Pref.	10	6 %	6 %	8 %	13%	2¼ – 2⅜	2¼ – 2⅜	48/9	47/6	..	4 10 11
1,473,658	Do. do. 5 % Perp. Deb. Stock ..	Stock	5 %	5 %	5 %	5 %	86 – 90	86 – 90	87	..	..	5 11 1
628,986	Do. do. 4½ % 2nd Deb. Stock Red.	100	4½%	4½%	4½%	4½%	66 – 70	66 – 70	..	..	..	6 8 7
100,000	British Insulated and Helsby Cables	5	8 %	10 %	10 %	10 %	7⅜ – 7⅝	7⅜ – 7⅝	7⅜	..	..	6 9 0
100,000	Do. do. 6 % Cum. Pref.	5	6 %	6 %	6 %	6 %	6¼ – 6⅝	6¼ – 6⅝	..	..	..	4 10 7
500,000	Do. do. 4½ % 1st Mort. Deb. Red..	100	4½%	4½%	4½%	4½%	103 –106	103 –106	..	..	..	4 4 11
304,947	British Thomson-Houston 4½ % 1st Mort. Debs. ..	100	4½%	4½%	4½%	4½%	91 – 96	91 – 96	..	..	..	4 18 11
400,000	British Westinghouse 6 % Pref., 1 to 200,000 and 275,001 to 475,000	5	Nil	Nil	Nil	Nil	3/16 – 7/16	3/16 – 7/16	..	..	..	Nil
1,016,268	Do. do. 4 % Mort. Deb. Stock ..	100	4 %	4 %	4 %	4 %	38 – 42	38 – 42	..	..	..	9 10 6
50,000	Browett, Lindley & Co., Ord.	1	Nil	Nil	Nil	Nil	5/16 – 11/16	5/16 – 11/16	..	..	..	Nil
50,000	Do. do. 6 % Cum. Pref.	1	Nil	Nil	Nil	Nil	14/6 to 15/6	14/6 to 15/6	..	..	..	Nil
140,976	Brush Electrical Engineering, Ord., 1 to 105,731 ..	2	2½%	Nil	Nil	Nil	0 – ⅛	0 – ⅛	..	..	..	Nil
200,000	Do. do. Non-cum. 6 % Pref.	2	6 %	Nil	Nil	Nil	0 – ⅛	0 – ⅛	..	..	..	Nil
125,000‡	Do. do. 4½ % Perp. Deb. Stock ..	Stock	4½%	4½%	4½%	4½%	43 – 48	43 – 48	..	..	..	9 8 8
125,000‡	Do. do. 4½ % Perp. 2nd Deb. Stock..	Stock	4½%	4½%	4½%	4½%	27 – 31	27 – 31	..	..	..	14 10 2
187,610	Calcutta Trams, 1 to 187,610	5	8 %	8 %	8 %	4½%	4¾ – 4¾	4¼ – 4⅞	96/8	92/6	+ ⅛	4 12 4
45,304	Do. 5 % Cum. Pref., Nos. 1 to 29,880..	5	5 %	5 %	5 %	5 %	4¾ – 5	4¾ – 5	..	..	..	5 0 0
350,000	Do. 4½ % 1st Deb. Stock..	100	4½%	4½%	4½%	4½%	97 –100	97 –100	..	..	..	4 10 0
95,000	Callender's Cable Construction shares	5	15 %	15 %	15 %	15 %	9⅜ – 10⅛	10 – 10⅜	..	..	+ ⅛	6 19 6
40,000	Do. do. 5 % Cum. Pref.	5	5 %	5 %	5 %	5 %	6⅛ – 6½	6½ – 6⅝	6½	..	+ ⅛	4 13 1
800,000	Do. do. 4½ % 1st Mort. Deb. Stock Red.	Stock	4½%	4½%	4½%	4½%	103½–105½	104½–106½	..	..	+1	4 4 6
491,292	Cape F. Trams., 1 to 4[illegible],223	1	Nil	Nil	Nil	Nil	⅛ – ¼	⅛ – ¼	..	..	..	Nil
450,000	Castner-Kellner Alkali, 1 to 450,000	1	6 %	8 %	12 %	12½%	1⅝ – 2	1⅝ – 2	..	..	..	6 0 0
910,158	Do. do. 4½ % 1st Mort. Deb. Stock	100	4½%	4½%	4½%	4 %	103 –106	103 –106	..	..	..	4 4 11
1,890,690	Central London Railway, Ord. Stock	Stock	4 %	4 %	3 %	3½%	61 – 63	61 – 63	62	..	..	5 3 2
554,655	Do. do. 4 % Pref. Stock	Stock	4 %	4 %	4 %	4 %	83 – 85	83 – 85	..	..	..	4 14 2
554,655	Do. do. Def. do.	Stock	4 %	4 %	2 %	2½%	43 – 45	43 – 45	..	..	..	5 11 1
1,400,000	City and South London Railway	Stock	1½%	2½%	3½%	1½%	31½ – 32½	31½ – 32½	..	..	..	4 12 4
85,000	Crompton & Co., Nos. 1 to 85,000	5	3½%	5 %	5 %	5 %	½ – 1	½ – 1	..	..	..	15 0 0
100,000‡	Do. 5 % 1st Mort. Reg. Debs., 1 to 900 of £100, and 901 to 11,000 of £50 Red.	..	5 %	5 %	5 %	5 %	91 – 94	91 – 94	..	..	..	5 6 5

* Unless otherwise stated, all shares are fully paid † A period of nine months. ‡ From Manchester Share List

Continued on next page

SHARE LIST OF ELECTRICAL COMPANIES.—(Continued.)

ELECTRICAL RAILWAY, MANUFACTURING AND INDUSTRIAL COMPANIES.—(Continued)

Present Issue.	NAME.	Stock or Share.	Dividends for the last four years. 1906.	1906.	1907.	1908.	Closing Quotations July 20th.	Closing Quotations July 27th.	Business done week ended July 27th, 1909. Highest	Lowest.	Rise + or Fall —	Present Yield per cent. £ s. d.
200,000	Dick, Kerr & Co., 1 to 200,000	1	10 %	10 %	10 %	10 %	1 3/16 — 1 1/4	1 3/16 — 1 1/4	..	..	..	8 0 0
305,000	Do. do. 6 % Cum. Pref., 1 to 305,000	1	6 %	6 %	6 %	6 %	1 5/16 — 1 3/8	1 5/16 — 1 3/8	..	..	..	4 16 0
271,080	Do. do. 4½ % Deb. Stock	100	4½ %	4½ %	4½ %	4½ %	99 —102	99 —102	..	..	..	4 8 3
60,000	Dublin United Trams. (1896), 6 % Pref., 1 to 60,000	10	6 %	6 %	6 %	6 %	13 — 14	13 — 14	..	..	..	4 5 9
99,261	Edison & Swan Utd., "A" shs., 48 pd., 1 to 99,261	5	4½ %	4½ %	2¾ %	..	1/4 — 3/8	1/4 — 3/8	1/8	3/8	..	25 0 0
17,139	Do. "A" shares, 01—017,139	5	4½ %	4½ %	2¾ %	..	1½ — 2¼	1½ — 2¼	..	..	..	5 0 0
307,895	Do. 4 % Deb. Stock Red.	100	4 %	4 %	4 %	4 %	68 — 73	68 — 73	68	73	..	5 9 7
67,720	Do. 5 % 2nd Deb. Stock Prov. Certs. all pd.	100	5 %	5 %	5 %	..	84 — 87	84 — 87	..	..	..	5 12 4
115,100	Electric Construction, 1 to 115,100	1	Nil	Nil	Nil	Nil	7/16 — 11/16	7/16 — 11/16	10/-	..	..	Nil
81,890	Do. do. 7 % Cum. Pref., 1 to 81,890	1	7 %	7 %	7 %	7 %	1 5/16 — 1 7/16	1 5/16 — 1 7/16	..	..	..	8 7 2
25,000	General Electric Co. (1900), 5 % Cum. Pref.	10	5 %	5 %	5 %	..	7½ — 7¾	7½ — 8	..	..	+ 1/16	6 5 0
200,000	Do. do 4 % Mort Deb.	Stock	4 %	4 %	4 %	4 %	85 — 88	85 — 88	..	..	..	4 10 11
78,000	Gt. N. & City Rail. Pref. Ord. "A" 4 %, 1 to 78,000	10	4 %	4 %	1½ %	Nil	3/4 — 1	3/4 — 1	..	..	..	6 13 4
96,000	Greenwood & Batley, 7 % Cum. Pref.	10	7 %	7 %	7 %	..	10½ — 10¾	10½ — 10¾	..	..	..	6 10 8
80,000	Do. do. 5 % Mort. Debs.	100	5 %	5 %	5 %	5 %	102 —103	102 —103½	..	..	..	4 16 10
40,000	Henley's (W. T.), Telegraph Works, Ord.	5	15%	15 %	18%	15 %	11¾ — 12¾	12 — 12¾	12¼	11 11/16	+ ¼	5 19 6
40,000	Do. do. 4½ % Pref.	5	4½%	4½%	4½%	4½%	5 — 5⅜	5⅛ — 5⅜	5 3/16	..	+ 1/8	4 1 10
150,000	Do. do. 4½ % Mort. Deb. Stock	Stock	4½%	4½%	4½%	4½%	105 —107	105⅛ —107½	15 1/16	14⅝	+ ⅛	4 3 9
50,000	India-Rubber, Gutta-percha & Telegraph Works	10	10%	10 %	10 %	10 %	14½ — 15½	14½ — 15½	..	..	..	6 11 2
37,500	Liverpool Overhead Railway, Ord.	10	Nil	Nil	⅛	Nil	3/8 — 7/8	3/8 — 7/8	..	..	..	Nil
10,000	Do. do. Pref., fully paid	10	5 %	5 %	5 %	5 %	5 — 6	5 — 6	..	..	..	8 6 8
600,070	London United Trams. (1901), 1 to 50,007	10	8 %	8 %	8 %	Nil	1½ — 2½	1½ — 2½	..	..	..	Nil
899,980	Do. do. 60,008 to 100,000	10	8 %	8 %	8 %	Nil	1½ — 2½	1½ — 2½	..	..	..	Nil
125,000	Do. do. 5 % Cum. Pref., 1 to 125,000	10	5 %	5 %	5 %	3½%	2 — 2½	2 — 2½	50/-	45/-	..	15 0 0
1,321,000	Do. do. 4 % 1st Mort. Deb. Stock	100	4 %	4 %	..	4 %	65 — 68	68 — 71	67½	66½	+3	5 12 8
5,782,062	Metropolitan Consolidated	100	2½%	1	½%	½%	40½ — 40¾	40½ — 41	41½	40½	+ ½	1 10 6
2,640,914	Do. Surplus Lands	100	2½%	2½%	2½%	2½%	68 — 70	67 — 69	68⅜	67½	—1	3 19 6
5,226,000	Do. District	100	Nil	Nil	Nil	Nil	17½ — 18	17⅞ — 17¾	17 5/8	17⅜	— ½	Nil
291,287	Metropolitan Electric Trams., Ord.	1	..	..	..	4½%	3/8 — 1/2	3/8 — 1/2	..	..	..	..
814,016	Do. do. Defd.	1	Nil	Nil	Nil	Nil	1/16 — 1/8	1/16 — 1/8	..	..	..	Nil
800,000	Do. do. 5 % Cum. Pref.	1	5 %	5 %	5 %	5 %	1/16 — 1/8	1/16 — 1/8	..	..	..	5 19 5
595,600	Do. do. 4½ % Deb. Stock Red.	100	4½%	4½%	4½%	4½%	96⅜ — 98½	95 — 97	..	..	..	4 12 9
$10,823,200	Mexico Trams Co., Common Stock	..	..	..	..	..	130 —132	126 —129	130	127½	—3½	..
$9,000,000	Do. 1st Mort. 50-year 5% Gld. Bds.	..	..	..	..	5 %	92½ — 94½	93 — 95	94½	93½	+ ½	5 5 3
245,500	Potteries Electric Traction	1	4 %	4 %	4 %	Nil	1/16 — 1/8	1/16 — 1/8	..	..	—1/16	..
245,500	Do. 5 % Cum. Pref.	1	5 %	5 %	5 %	5 %	3/8 — 1/2	3/8 — 1/2	12/-	11/6	..	6 17 11
245,000	Do. 4½ % Deb. Stock	100	4½%	4½%	4½%	4½%	86 — 89	86 — 89	..	..	..	5 1 2
37,350	Telegraph Construction and Maintenance	12	15 %	15 %	17½%	15 %	33½ — 35	34½ — 36	35	33½	+1	5 0 0
140,000	Do. 4 % Deb. Bds., 1 to 1,500 Red., 1909	100	4 %	4 %	4 %	4 %	99 —101	99½ —101½	..	..	..	3 18 10
1,000,000	Underground Electric Railway, 5% Prior Lien	..	..	..	..	5 %	102½ —103½	102½ —103½	103½	10/½	+ ½	4 16 7
2,800,000	Do. do. 4½% Bonds	..	..	..	..	4½%	87 — 89	87 — 89	88⅝	..	..	5 1 2
4,900,000	Do. do. 6% Income Bonds	..	..	..	..	..	37 — 39	36 — 38	37½	..	— 1	..
66,666	Willans & Robinson, 1 to 80,000 & 80,001 to 116,666	5	Nil	Nil	10 %	Nil	3/16 — 5/16	3/16 — 5/16	..	..	..	..
66,666	Do. 6 % C.P., 80,001 to 80,000 & 125,001 to 141,666	1	Nil	..	6 %	6 %	2¾ — 3½	2¾ — 3½	..	..	..	7 7 4
245,495	Do. % 1st Mort. Deb. Stock		4 %	4 %	4 %	4 %	76 — 80	76 — 80	..	..	..	5 0 0

ELECTRICITY SUPPLY COMPANIES.

15,000	Bromley (Kent) E.L. & P., 1 to 15,000		5½%	5½%	5½%	5½%	4½ — 4¾	4½ — 4¾	..	..	..	5 10 0
70,000	Do. do. 4½ % 1st. deb. stock	100	4½%	4½%	4½%	4½%	93 — 96	93 — 96	..	..	..	4 18 9
80,449	Brompton & Kens. Elec. Lt. Sup., Ord., 1 to 20,000	5	10 %	10%	10 %	10 %	8 — 8½	8 — 8½	8⅛	8	..	5 17 8
9,551	Do. do. 7 % Cum. Pref.	5	7 %	7 %	7 %	7 %	8 — 8½	8 — 8½	..	..	..	4 2 4
396,876	Central Electric Supply 4 % Guar. Deb. Stock	100	4 %	4 %	4 %	4 %	97 —100	97 —100	..	..	..	3 18 5
80,000	Charing Cross and Strand Electricity Supply	5	5 %	5 %	5 %	5 %	3⅞ — 4⅛	4 — 4½	87/6	..	+ ½	5 11 1
80,000	Do. do. do. 4½ % Cum. Pref.	5	4½%	4½%	4½%	4½%	4⅜ — 4½	4½ — 5	95/-	..	+ ½	4 10 0
80,000	Do. "City Undertaking" 4½ % Cum. Prf.	5	4½%	4½%	4½%	4½%	3¾ — 4	3¾ — 4⅛	..	..	+ ⅛	5 2 10
445,736	Do. do. 4 % Deb. Stock Red.	100	4 %	4 %	4 %	4 %	96 — 99	96 — 99	..	..	..	3 19 8
49,486	Chelsea Electricity Supply, Ord.	5	5 %	4½%	4½%	4½%	3⅜ — 4⅛	3⅜ — 4⅛	..	..	..	5 9 1
175,000	Do. do. 4½ % Deb. Stock Red.	Stock	4½%	4½%	4½%	4½%	100 —103	100 —103	..	..	..	4 7 5
70,595	City of London Elec. Lighting, Ord. 40,001—110,595	10	6 %	6 %	6 %	6 %	10½ — 11	10¼ — 11	10⅞	10 3/4	..	5 9 1
40,000	Do. 6 % Cum. Pref., 1 to 40,000	10	6 %	6 %	6 %	6 %	12 — 13	12 — 13	12 1/16	12 1/8	..	4 12 4
400,000	Do. 5% Db. Stk., Scrip. (iss. at 115) all pd.		5 %	5 %	5 %	5 %	121 —124	121 —124	..	..	..	4 0 8
800,000	Do. 4½ % 2nd. Db. Stk., Prov. Crts., all pd.	100	4½%	4½%	4½%	4½%	99 —102	99 —102	..	..	..	4 8 3
50,000	County of Durham Electrical Power, Ord.	5	4 %	4 %	2 %	..	2⅜ — 2½	2⅜ — 2½	..	..	..	3 6 8
50,000	Do. do. 6 % Pref.	5	6 %	5 %	5 %	5 %	3⅛ — 3¼	3⅛ — 3¼	..	..	..	6 13 4
250,000	Do. do. 5 % 1st Mtg. Deb.	Stock	..	..	..	5 %	93¼ — 95½	93¼ — 95½	..	..	..	5 4 9
40,000	County of London Electric Lighting, Ord. 1—40,000	10	5 %	5 %	5 %	5 %	8¼ — 8⅝	8⅜ — 8⅝	..	..	..	5 6 8
55,000	Do. do. 6 % Pref., 40,001—60,000	10	6 %	6 %	6 %	6 %	10⅝ — 11¼	10⅝ — 11⅛	11 1/16	10 15/16	+ ⅛	5 6 8
400,000	Do. do. 4½ % Deb. Stock	..	4½%	4½%	4½%	4½%	103 —106	103 —106	106	..	..	4 4 11
400,000	Do. do. 4½ % 2nd. Deb. Stock	Stock	4½%	4½%	4½%	4½%	100 —103	100 —103	..	..	..	4 7 5
80,000	Edmundson's Electric Corporation, Ord. Shares	5	4 %	Nil	Nil	Nil	1/16 — 1/8	1/16 — 1/8	..	..	..	Nil
80,000	Do. do. 6 % Cum. Pref.	5	6 %	3 %	Nil	Nil	1/16 — 1/8	1/16 — 1/8	..	..	..	Nil
480,500	Do. do. 4½ % 1st Mort. Deb. Stk.	100	4½%	4½%	4½%	4½%	59 — 62 xd	59 — 62	59½	59¼	..	7 5 2
$8,150,000	Electrical Dev.Co.of Ontario, 5% 1stMtg.Gold Bnds.	$500	..	..	..	5 %	85½ — 86½	84½ — 86½	86½	84½	—1½	5 16 3
10,000	Folkestone, 1 to 10,000	5	5½%	5½%	5½%	5½%	4¾ — 5	4¾ — 5	..	..	..	5 10 0
10,000	Do. 5 % Cum. Pref., 1 to 10,000	5	5 %	5 %	5 %	5 %	5 — 5¼	5 — 5¼	..	..	..	4 10 0
90,000	Do. 4½ % 1st Deb. Stock	100	4½%	4½%	4½%	4½%	98 —101	98 —101	..	..	..	4 9 1
15,000	Hove, 1 to 15,000	5	9 %	9 %	8½%	8½%	7⅞ — 7⅞	7⅞ — 7⅞	..	..	..	5 11 6
$1,875,000	Kaministiquia Power Co., 5 % Gold Bnds.	..	..	..	..	5 %	97½ —100½	97½ —100½	98	..	..	4 19 6
21,000	Kensington and Knightsbridge Electric Ord.	5	10 %	10 %	10 %	8 %	6¾ — 7⅛	6¾ — 7⅛	..	..	..	5 8 6
90,000	Do. do. do. 4 % Deben. Stk.	Stock	4 %	4 %	4 %	4 %	97 —100	97 —100	..	..	..	3 19 3
111,000	London Electric Supply Corporation, Limited, Ord.	3	4 %	4 %	2½%	3 %	1½ — 2⅛	1½ — 2⅛	..	..	..	4 16 0
70,000	Do. do 6 % Pref.	5	6 %	6 %	6 %	6 %	5⅛ — 5⅝	5⅛ — 5⅝	..	..	..	5 11 8
882,255	Do. do. 4 % 1st Mort. Deb. Stk. Red.	Stock	4 %	4½%	4½%	4 %	93 — 97	93 — 97	..	..	..	4 2 6
200,000	Metropolitan Electric Supply, 1 to 100,000	5	10 %	8 %	6½%	5 %	4½ — 4⅝	4½ — 4½	93/1½	..	+ 1/16	5 6 8
78,121	Do. 4½ % Cum. Pref. 1—71,106	5	4½%	4½%	4½%	4½%	4⅝ — 5	4⅝ — 5	..	..	..	4 10 0
285,000	Do. 4½ % 1st Mort. Deben. Stock	..	4½%	4½%	4½%	4½%	105 —108	105 —108	..	..	..	4 3 4
248,000	Do. 5% Mort. Deben. Stock Redem.	Stock	5%	5%	5%	5%	85½ — 86½	85½ — 86½	..	..	..	4 0 11
$6,000,000	Mexican Electric Light Co., 5% 1st Mtg. Gold Bnds	..	5 %	5 %	5 %	5 %	82 — 84	82 — 84	83⅜	..	..	4 18 7
18,585,000	Do. Light and Power Co., Ltd., Common	..	..	..	..	3½%	68 — 72	67 — 71	71½	69½	—1	4 17 3
$2,400,000	Do. do. 7% Cum. Pref. Stk.	$100	..	..	..	7 %	103 —107	104 —108	106½	105	..	5 11 1
$12,000,000	Do. do. 5% 1st Mtg.Gold Bnds.	Stock	..	..	..	5 %	87⅞ — 89½	88 — 90	89½	88½	+ ½	5 12 4
950,000	Midland Electric Corporation, 4½ % 1st Mort. Deb.	100	4½%	4½%	4½%	4½%	94 — 97	94 — 97	..	..	..	4 12 9
180,491	Newcastle-on-Tyne, 1 to 87,500	5	8 %	8 %	8 %	2½%	4⅜ — 5⅛	4⅜ — 5⅛	..	..	— ⅛	2 10 0
131,000	Do. 5 % Pref., 1 to 87,500	5	5 %	5 %	5 %	5 %	4⅜ — 5⅛	4⅜ — 5⅛	..	..	..	4 16 3
126,500	North Metropolitan Electric Power Supply Co., 5 % Mortgages (Red.), Nos. 1 to 1,265	100	..	..	..	..	99 —101	99 —101	..	..	..	..
10,862	Notting Hill Electric Lighting	10	7½%	7½%	7½%	7 %	11½ — 12½ xd	11½ — 12½	..	..	..	5 14 3
20,000	Oxford, 1 to 96 and 407 to 20,310	5	7 %	7 %	7 %	..	6 — 6¼	6 — 6¼	..	..	..	5 7 8
50,000	Do. 4 % Deb. Stock	100	4 %	4 %	4 %	4 %	92 — 95 xd	94 — 97	..	..	..	4 4 3
119,694	River Plate Elety. Co. Ord. Nos. 1 to 120,507	1	..	2½%	6 %	8 %	1⅝ — 1¾	1⅝ — 1⅞	28/-	..	..	5 7 9
100,000	Do. do. 6% Non Cum. Pref. Nos. 1 to 100,000	1	6 %	6 %	6 %	6 %	1⅝ — 1¾	1⅝ — 1¾	20/9	20/-	..	5 10 4
200,000	Do. do. 5% Deb. Stk. Red.	100	5 %	5 %	5 %	5 %	102 —105	102 —105	..	..	..	5 8 1
40,000	St. James' and Pall Mall Electric Light, Ord.	5	12½%	10 %	10 %	10 %	8⅝ — 9⅛	8⅝ — 9⅛	9⅛	..	..	6 13 4
90,000	Do. do. 7 % Pref. 20,081 to 40,080	5	7 %	7 %	7 %	7 %	7 — 7⅛	7⅛ — 7⅝	..	..	+ ⅛	4 11 10
150,000	Do. do. — 3½ % Deb. Stock Red.	100	3 %	3½%	3½%	3½%	84 — 88	84 — 88	86	..	..	3 19 7
12,000	Smithfield Markets Electric Supply, Ord.	5	4 %	Nil	Nil	Nil	3/16 — 5/16	3/16 — 5/16	..	..	..	Nil
85,000	South London Electric Supply, Ord.	4	4 %	3 %	4 %	5 %	3⅛ — 3¼	3⅛ — 3¼	..	..	..	6 9 0
120,000	South Met. Elec. Lt. & Power, Ord.	1	2½%	2½%	2½%	2½%	5/16 — 7/16	5/16 — 7/16	..	..	..	4 8 11
142,968	Do. do. 7 % Pref.	1	7 %	7 %	7 %	7 %	1⅝ — 1⅞	1⅝ — 1⅞	..	..	..	5 6 8
224,520	Do. do. 4½ % 1st Deb. Stk.	100	4½%	4½%	4½%	4½%	100 —103	100 —103	..	..	..	4 0 0
80,000	Urban Electric Supply, Ord.	5	5 %	5 %	5 %	5 %	¾ — 1	¾ — 1	..	..	..	25 0 0
50,000	Do. do. 5 % Cum. Pref.	5	5 %	5 %	5 %	5 %	1½ — 2⅛	1½ — 2¼	..	..	— ⅛	11 15 4
275,000	Do. do. 4½ % 1st Mort. Db. Stk. Red.	100	4½%	4½%	4½%	4½%	80 — 84	79 — 83	..	..	—1	5 8 5
806,000	Victoria Falls Power Co., Pref. Nos. 1 to 800,000	1	..	..	..	5 %	3/16 — 5/16	3/16 — 5/16	..	..	+ 1/16	5 6 8
110,000	Westminster Electric Supply, Ord.		11 %	11 %	10 %	10 %	8½ — 9½	8½ — 9½	..	..	..	6 11 2
81,279	Do. do. 4½ % Cum. Pref. Reduced from 5% since 31st Dec., 1905)	5	5 %	4½%	4½%	4½%	4⅛ — 5⅛ xd	4⅛ — 5⅛	5	..	..	4 3 9

* Unless otherwise stated, all shares are fully paid. † Quotations on Liverpool Stock Exchange. Interim Dividend.

Bank rate of Discount 2½ per cent., April 1st. 1909.

THE ELECTRO-MECHANICAL PROPULSION OF SHIPS.

By A. P. CHALKLEY, B.Sc.

(*Concluded from page* 154.)

A system which is attracting widespread notice is that of Mr. Durtnall, who for many years has interested himself in the problem of electric propulsion. Fig. 5 shows his "Paragon" system, in which, as in the previous case, three-phase alternating current is used, but variations of speed are obtained in a different manner, the generator being of special design, instead of the motor, as in the Mavor

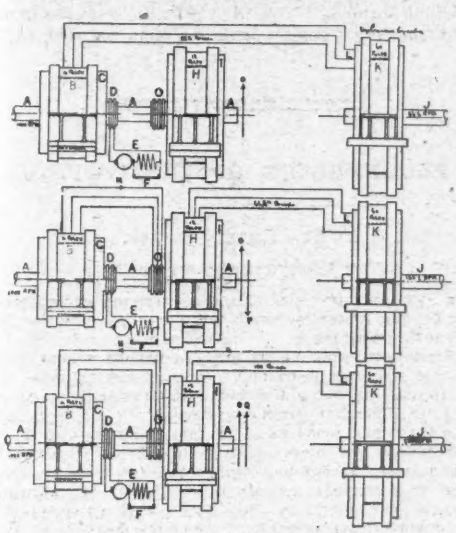


Fig. 5.

arrangement. In the figure, A is the shaft of the prime mover (which may be a turbine or a gas or oil engine), and on it are the rotors of two machines, B, the generator, and H, the transformer generator; K is the low-speed motor in the stern of the ship, driving the propeller shaft J direct, the motor being of the ordinary efficient three-phase squirrel-cage type. The object of the transformer generator is to vary the periodicity of the current supplied to the motor, and hence allow economical variations of speed. To take an explicit case, suppose the generator B to be wound with four poles, the transformer-generator H with 16 poles, and the motor K with 60 poles, the speed of the prime mover being 1,000 R.P.M. The field of the exciter E is first short-circuited by the switch F, but on breaking this the voltage rises in the generator, giving a periodicity of $1,000 \times 2 \div 60$ equals 33·3 per second, and if by means of suitable switchgear the current is taken directly into the motor, the latter will have a synchronous speed of $4 \times 1,000 \div 60$ equals 66·6 R.P.M. To bring the motor up to its second speed, the exciter field is short-circuited again, and the current from H is led into the slip rings of the rotor (or primary) of the transformer generator, from the stator (or secondary) of which, the motor K now receives its power.

Referring to the top diagram in fig. 5, the arrow O shows the direction of rotation of the prime mover, and, of course, of the rotor of the transformer generator, and the connection to the slip rings G is such that the flux due to the current is in an opposite direction to that of rotation. We have, therefore, $4 \times 1,000$ equals 4,000 alternations per minute, due to B, and $12 \times 1,000$ equals 12,000 alternations per minute due to H, *but in an opposite direction*. The periodicity is, therefore, $12,000 - 4,000 \div 2$ equals 4,000 per minute, or 66·6 per second, giving a synchronous speed of the motor of 133·3 R.P.M. For the third and maximum speed the voltage is once more reduced to zero by closing the switch F, two of the phases of the generator being reversed, and the voltage brought up again. The flux in H, due to the generator, is now in the same direction as the speed of rotation and the alternations of current in the secondary of the transformer generator are 12,000 plus 4,000 equals 16,000 per minute, or 133·3 periods per second, giving a synchronous motor speed of 266·6 R.P.M. It will be noticed that these changes can be brought about by the use of very simple switchgear, that each speed gives a high overall efficiency, since the losses are only equivalent to transformer losses, which are notoriously low, and that the speed of the prime mover remains unaltered throughout.

Any intermediate speed of the motor (and propeller) could be obtained by mounting the stator of the transformer generator on bearings, and braking it to give any required periodicity, but this is not to be recommended for marine work, and is, indeed, unnecessary, since three speeds will satisfy all requirements. The motor may be reversed, and the same three speeds obtained, going astern, by simply reversing two of the phases of the motor, and it is evident that practically the same efficiency could be relied upon, as in the previous case, besides which, manœuvring will be carried out with great ease and precision.

In America there is already an electrically-propelled boat in operation, being used as a fire float at Chicago, and its results are most satisfactory, though, of course, it is only a small affair of about 500 H.P. In this case the steam turbines drive both generators and rotary water pumps, which is a very economical arrangement, since power is not required by the propelling motors when water is needed from the pumps. The generators are D.C. machines, the voltage being about 250, and series wound motors are employed for driving the propellers. The general disposition of the machinery in the boat is seen in fig. 6, from which it appears that there are two turbine sets with the condenser in the middle, the boat being propelled by the two motors, which are placed well in the stern. Above the propeller motors, on a platform, are small turbine-driven exciters for the main generators. The whole of the machinery is conveniently at the command of the pilot, since everything may be operated by two controllers, on either side of the wheel.

There is at present working in Russia a boat fitted with Diesel oil engines, and driven by electric power, designed in a somewhat novel manner to overcome the loss of efficiency at low speeds. The Diesel engine is coupled to a direct-current generator, which at cruising speed delivers its power to separately-excited motors on the propeller shaft; but when full speed is required, a magnetic clutch engages automatically, and the oil engine drives the propeller shaft direct. This system is bold and

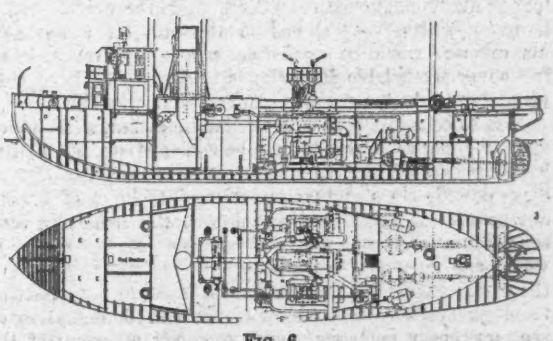


Fig. 6.

interesting, particularly from the fact that oil engines are used as prime movers, but it is probably not nearly so efficient an arrangement as it would have been with a purely electrical drive, for the speed of the Diesel is almost certainly far too high to obtain maximum economy from the propellers, and, moreover, full power is not provided for the reverse, which will lessen the ease of manœuvring.

The prospects of electric propulsion would admittedly be small, unless some substantial reduction in running costs could be predicted, but fortunately a complete investigation of steam consumptions for both systems shows a very marked advantage in favour of electricity for almost every type of ship. It will be sufficient, for purposes of comparison, to take as instances two totally different boats, and see what saving could be effected in each case. Of course, it may be said that figures will prove anything, and the upholders of the electro-mechanical system are the first to admit that

their calculations are not absolute; but what they do insist upon is that the disproportion in costs between the two methods is, apparently, so very great, that the figures show definitely that electro-mechanical propulsion merits a fair and exhaustive trial.

Taking the results actually obtained on the *Dreadnought*, we find that at full power nearly 30,000 H.P. is required, and the steam consumption was about 14·7 lb. per shaft H.P.-hour, including auxiliaries, the speed of the propellers being 300 R.P.M. In place of direct drive, consider an electrical system in which four turbo-alternators of 6,000 KW. output each are employed, the power being delivered to four 7,500 B.H.P. three-phase motors, having an efficiency of 95 per cent., which is quite allowable. A steam consumption of 14·5 lb. per KW.-hour for the turbines, including auxiliaries, would be guaranteed by any firm of turbine manufacturers (no superheat being used, to keep the comparison legitimate), which is equivalent to 10·9 lb. per H.P.-hour. This means that the consumption of steam per H.P.-hour at the propeller shaft is 10·9 ÷ ·94 = 11·6 lb. per shaft H.P.-hour, as against 14·7 lb., with direct drive, showing a saving of 21 per cent. in steam and coal. This is the economy produced at full speed, but it would be even more marked at cruising speed, which is the general condition for a battleship. In this case, the electrical system would be practically equally efficient, or at any rate within 7 or 8 per cent., since part of the generating plant could be shut down, and the remainder run at full power, but with the direct drive the efficiency drops at least 20 per cent., and probably more. This fact is well brought out in the figures given by Mr. Bell in his paper before the Institution of Naval Architects last year, with reference to the *Lusitania*, in which it was stated that the steam consumption at 25·4 knots was 12·77 lb. per shaft H.P.-hour, while at 15·8 knots the consumption was 21·23 lb.—an increase of nearly 40 per cent. Of course, this difference would not be so great in a battleship where special cruising turbines are employed, but it would be sufficient to show a heavy margin in favour of electricity. As regards first costs, there is, to commence with, a saving of 21 per cent. in boiler power, size of feed, air and circulating pumps, condensers, piping and many auxiliaries, while the astern turbines and the greater portion of the propeller shafting would disappear. In the *Dreadnought* there are 10 turbines, so that it is not beyond the realm of possibility to assume that the electrical plant, with four turbo-generators and four motors, would cost less than with the direct drive, allowing for the above-mentioned reductions, while the weight would be more or less proportional to the cost (or *vice versa*). Manœuvring would be carried out much more easily, since full power is available for going astern, and this is a point which cannot be too strongly emphasised in warships.

It is to be noted that if superheat were used, a saving of another 7 per cent. could safely be reckoned on, since it is well known that 100° superheat causes a reduction of 7 or 8 per cent. in the steam consumption of turbines of almost any power. It might be argued that this cannot be considered an economy for the electric drive, since it would apply equally to the direct drive, but this is not the case. Superheat has never been used for large marine turbines, probably on account of the fear of distortion of the very heavy cylinders, and consequent stripping of the blades, but this point scarcely enters into consideration with high-speed turbines, coupled to alternators, since the cylinder castings are so very much lighter.

There is, in fact, no reason against the use of 100° or 150° superheat in electrically propelled vessels, and this may be accepted as an inherent advantage of the system, and the gain in efficiency by superheat added to the increased economy, in the case of the *Dreadnought*, would then become 28 per cent. in favour of electric propulsion.

On the above showing, it will be admitted that a good case has been made out for battleships, since the figures are not mere assumptions, but are those actually obtained in practice, and it will be seen that equally good results may be anticipated with intermediate speed liners.

One of the commonest types afloat is the 14 to 18-knot boat, driven by reciprocating engines—a type which the turbine has been practically unable to touch, because of the comparatively low speed, but which is eminently adapted for electric propulsion. One of the modern Cunard liners of 15 knots has been found to require 13·5 lb. of steam per I.H.P.-hour, or, allowing the high efficiency of 85 per cent., the engines take 15·9 lb. per shaft H.P.-hour. The total shaft horse-power is 8,000, and this, in the electric system, could be obtained by two 4,000-B.H.P. squirrel-cage motors of 95 per cent. efficiency, the input being, therefore, 8,400 H.P., of 6,300 KW. For the generation of this power, two turbo-alternators (three-phase) of 3,500 KW. each, would be employed, the surplus current being used for various auxiliary purposes, and replacing the electric generating engines. The steam consumption of turbines of this power, running at 1,000 or 1,200 R.P.M., with 100° superheat, and 28 in. vacuum would not exceed 14 lb. per KW.-hour, excluding auxiliaries, or 10·5 lb. per H.P.-hour. This is equivalent to 10·5 ÷ ·95 equals 11 lb. per shaft H.P.-hour, as against 15·9 lb. with reciprocating engines, showing a saving of no less than 31 per cent.

PROCEEDINGS OF INSTITUTIONS.

The Faraday Society.

THE ELECTRODEPOSITION OF BRASS.

IT is a surprising fact that, although electroplating is the very oldest of the electrochemical industries, its practice is still almost entirely pervaded by the "rule-of-thumb" method, and it is only just now beginning to progress beyond a point which was already attained 50 years ago. The admirable paper, entitled "The Conditions which Determine the Composition of Electro-deposited Alloys: I. Copper-Zinc Alloys," which MR. S. FIELD, of the Northampton Institute, read before the Faraday Society on June 29th, is a healthy symptom of the passing away of the old state of affairs. It is to be hoped that it will be carefully studied by the large number of persons engaged in the electroplating industries, particularly in such districts as Clerkenwell, where "rule of thumb" is rampant, and that Mr. Field and others will follow up this experimental study of one branch of electroplating by others which will cover the whole field of practice of this most interesting art. This paper on brass deposition is all the more welcome, as it is the first systematic study on the subject which has appeared, at least in English, as far as our recollection of the subject goes.

It is obvious that to deposit an alloy of constant composition, we must use a mixed solution of the metals from which each is deposited at the same E.M.F.; or, in other words, we must electrolyse compounds having approximately the same heat of formation. In the case of copper and zinc, the constituents of brass, these conditions are more or less fulfilled by the cyanide solutions of the metals, and the metallic ions, therefore, are easily discharged together. The E.M.F. of deposition of the two metals, however, is strongly influenced by such conditions as the concentration of each in solution, the amount of free cyanide in solution, the temperature, the current density employed, the amount of stirring the solution is subject to, and so forth, and it is the influence of these conditions on the composition of the brass deposited which forms the subject of Mr. Field's investigation. In practice it is of great importance to know how to change the composition of the deposit, because, generally speaking, one has to deal with cathodic objects of very irregular shapes, so that there is a varying current density at different points of the cathode, and hence brass of varying composition is continually being deposited, and the composition of the solution being correspondingly altered automatically. To rectify or make the necessary allowances for these unavoidable changes is one of the duties of the skilled electroplater.

A preliminary word on the electrolysis of cyanide solutions may be usefully stated here. The solution from which brass is deposited consists of a mixture of the double cyanides of copper ($CuCN.KCN$) and zinc ($Zn(CN)_2.2KCN$). The ions of solutions of these salts are $K^{\cdot}$, $Cu(CN)_2^{-}$, and $K^{\cdot}$, $Zn(CN)_4^{-}$ respectively. Consequently, the metals copper and zinc are deposited from solution by secondary chemical reactions, potassium being the primary cathodic product:—

$$\left.\begin{aligned} K^{\cdot} + CuCN.KCN &= Cu + 2\,KCN \\ 2\,K^{\cdot} + Zn(CN)_2.2\,KCN &= Zn + 4\,KCN \end{aligned}\right\} \quad \ldots \quad (1)$$

At the anodes, insoluble cyanides of copper and zinc are formed:—

$$\left.\begin{aligned} Cu(CN)_2^{-} + Cu &= 2\,CuCN \\ Zn(CN)_4^{-} + Zn &= 2\,Zn(CN)_2 \end{aligned}\right\} \quad \ldots \quad \ldots \quad (2)$$

Unless the solution is stirred, so as to bring the free potassium cyanide formed at the cathode up to the anode, these cyanides of copper and zinc will form an insulating coating on the brass anode. In practice, however, free cyanide is present in the solution, and this keeps the anodes clear, so that they dissolve freely. The free cyanide (being only slightly dissociated) does not impart conduct-

ance to the solution in the same way that free acid does, say, to a copper sulphate solution.

It will be seen from equations (1) that the same current will deposit about twice as much copper as zinc, hence under ideal conditions the resultant brass will approximate to the composition 2 Cu : 1 Zn. This is a very fortunate dispensation, as brass of that quality happens to have a fairly average colour, although erring somewhat on the light side.

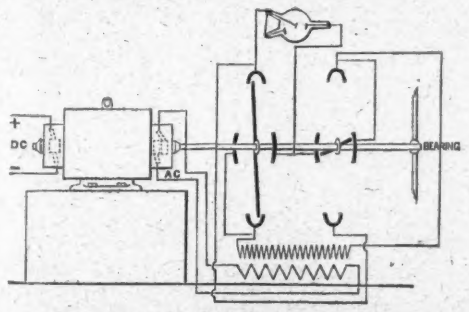
It will be impossible here to describe in any detail all the experiments Mr. Field has made on the conditions which influence the composition of the brass depcsit; those specially interested in the subject must carefully study the original paper. Suffice it to say that as the solution of zinc and copper and their deposition follow very different laws, there must be a continual change of composition in the electrolyte, and hence it is of the utmost importance to know how changes in such conditions as (1) density composition of electrolyte; (2) rate of agitation; (3) current density; (4) temperature, will affect the proportions of copper and zinc in the brass deposit. The general conclusions arrived at by Mr. Field are briefly as follows:—Conditions which tend to raise the P.D. between the terminals of the cells, such as dilution of the solution, decrease of temperature, and increased current density, increase the percentage of zinc in the deposit. On the other hand, the addition of free cyanide increases the percentage of copper in the deposits, and it also increases the solution of hydrogen, unless this be minimised by rapid agitation. Copper may be freely deposited with a large proportion of zinc compound present. The one important respect in which Mr. Field's research is incomplete is that he has not yet studied the effect of very rapidly stirring the solution, that is, far beyond the agitation necessary merely to ensure free solution of anodes. The rapid renewal of electrolyte near the cathodes, due to very vigorous agitation, is certain to have a very considerable effect on the deposits, and it is to be hoped that Mr. Field will extend his experiments in this promising direction. We would also express the hope that his studies will not stop at the electrodeposition of brass, but will also include the deposition of such other useful alloys as bronze, which now also has considerable practical application.

A paper by DR. HENRY SAND on "Rapid Electro-analytical Separation of Metals" contains a description of some developments in the apparatus designed for this purpose some years ago by the author. The apparatus—which is in constant use at the National Physical Laboratory—makes it possible to deposit and separate, in most cases in from 5 to 15 minutes, the metals silver, mercury, copper, bismuth, lead, cadmium, zinc, antimony and tin.

DR. R. BECKETT DENISON, in a research on "The Relative Rates of Migration of Ions in Aqueous Solution," has determined by the well-known method (devised by himself and Dr. Steele) of direct observation of moving ionic boundaries, the transport numbers of the halide salts of the metals of the alkalis and alkaline earths. It is pointed out that the study of transport numbers by the direct and indirect methods affords a means of determining the degree of hydration of the ions.

The Röntgen Society.

AT the annual general meeting on June 3rd, MR. R. S. WRIGHT read a paper on the new Snook Röntgen apparatus. This apparatus is the invention of Mr. H. Clyde Snook, of Philadelphia, and for some time it was manufactured only by the American firm which Mr. Snook represents. During the autumn of last year arrangements were concluded for the instrument to be made in this country, but this involved laying down new and expensive machinery, and it was not until the early spring that arrangements for the manufacture in England were completed. The instrument shown was constructed in this country from beginning to end; it was the 2 KW. size, and weighed a good many hundredweight.



CURRENT RECTIFIER OF THE SNOOK GENERATOR.

The essential parts are three; a motor-converter, a high-tension transformer, and a pole-changing rectifier. The sole function of the motor-converter shown on the extreme left is to convert the original continuous current into a sinusoidal or alternating one, and this is supplied to a high-tension step-up transformer giving some 100,000 to 120,000 volts on the secondary circuit. Above this transformer is the revolving commutator or rectifier shown on the right, which is rigidly attached to the axle of the motor-converter (thereby ensuring absolute synchronism), transforming the alternating discharge into a unidirectional one. For the sake of clearness, the regulating switchboard, resistance, &c., are omitted in this diagram.

The transformer is of the closed-circuit type, and the winding is extremely intricate.

In working the apparatus, the first step is to start the motor by means of the ordinary starting switch attached to the switchboard, and then by simply closing the switch controlling the winding of the transformer, we can obtain an absolutely unidirectional discharge from the secondary, regulated to any extent by means of the adjusting rheostat. Whether the output is great or small, there is absolutely no reverse current.

If an X-ray tube is connected to the dischargers, the current in it can be varied at will from ½ milliampere up to 30, 40 or 50 milliamperes; all that is needed is to vary the resistance. There being no uncertain contact-breaker to reckon with, the current from the X-ray tube rises and falls accordingly as the switch handle is turned to the right or to the left.

The radiographs obtained with the apparatus are practically instantaneous; the actual time of exposure is certainly within one-tenth of a second. Extreme detail is obtained in the soft tissues, much greater than is seen in a radiograph taken with a longer exposure.

The large currents used undoubtedly put a heavy strain on the X ray tubes, and no doubt the weak point at present is the impossibility of finding tubes that will carry with anything like real safety a current of 50 or 60 milliamperes. Fortunately it seems to be the case that a tube exhausted while a current of a certain strength is being passed through it will stand that current in after work very much better than a tube not so exhausted, and this apparatus affords a ready means of putting such a heavy current through X-ray tubes for any length of time desired.

Physical Society of London.

AT the meeting held on June 25th, amongst other papers, one was read by MR. A. CAMPBELL "On the Measurement of Wave Length for High-frequency Electrical Oscillations." The experiments had for their object the calibration of wavemeters for the measurement of the high frequencies (200,000 up to 1,000,000 cycles per sec.) used in wave-telegraphy. Two wavemeters were tested, both being of the type consisting of a series of self-inductance coils used singly in series with a variable air-condenser and a thermo-ammeter, the capacity being altered until the circuit showed resonance with the working circuit. The coils of one wavemeter were wound with solid wire, those of the other with stranded wire (7/36), each strand being separately insulated. The absolute value of the frequency was determined by photographing spark-trains in the primary circuit by means of a rotating mirror running at a constant and accurately measured speed. The values of the frequency deduced from the measured values of K and L with the stranded-wire wavemeter were in close agreement with the actual values deduced from the spark-photographs. With the other wavemeter the agreement was not nearly so close. The results show that the inductances of the stranded-wire coils are practically unaltered for frequencies from 0 up to 1,000,000 cycles per second.

A paper on "An Electro-Magnetic Method of Studying the Theory of and Solving Algebraical Equations of any degree," by DR. RUSSELL and MR. ALTY, was read by the authors. A simple apparatus which the authors had devised for students' use was described, with which all the roots could be determined with a maximum inaccuracy of 1 per cent.

DR. C. V. DRYSDALE exhibited a new Fery thermo-electric calorimeter. This form of calorimeter can be used continuously, and permits the value of the gas produced in a gasworks or producer plant to be watched from time to time. The principle of the instrument is that of burning the gas to be tested at a constant rate in a special burner consuming from 5 to 10 litres per hour. This burner heats a recuperative thermopile, of which the cold junction is traversed by the air employed for the combustion, while the hot junction is heated by the products of combustion. The thermopile contains 15 junctions, which enable a P.D. of ·2 volt to be obtained. The energy produced is sufficient to obtain a trace with a recording instrument similar to that obtained with the Richard recording thermometers and barometers.

A paper by MR. F. W. JORDAN, on "An Instrument for Measuring the Strength of an Intense Horizontal Magnetic Field," was read by the author. The method consisted in measuring directly the transverse force on a conductor traversed by a current in a direction at right angles to the field.

German Installation Contractors' Union.—The seventh annual conference of the Union of Electrical Installation Firms was held recently at Aix-la-Chapelle, where representatives of kindred firms were present from Austria, Switzerland and Belgium. It was mentioned in the annual report that the scope of the union was extended during the year, and now comprised 392 firms, who are distributed over a number of branch associations. The turnover of the co-operative purchasing organisation of the union amounted to £65,000 in 1908, as compared with £40,000 in 1907, and the net profits were £6,250 and £4,450 in the two years respectively. The report also referred to the work accomplished in the direction of the simplification and unification of the rules for the erection of installations, the collection of statistics in regard to accidents, and the memorials presented to the responsible authorities for the purpose of combatting the system of monopoly in the electrical industry.

PARLIAMENTARY.

Electric Lighting Acts (Amendment) Bill.

(*Concluded from page* 134.)

Mr. Henderson said that his experience was that local authorities occasionally objected to tramways and electric lighting schemes unreasonably, and therefore he thought it would be much better if the Board of Trade was to remain the authority.

Mr. Courtenay Warner said, in his opinion, it was very essential that the local authority should have the power it was proposed to give them. As Mr. Tennant had pointed out, it was not absolute power, but it was a power that was given to all the local authorities in London, and he could not see why urban or district councils should not have the same power.

Mr. Parker said he thought they needed a clearer definition as to what a local authority was. In his view the authority to whom this power should be given was the highway authority.

Sir W. Collins agreed with the previous speaker, and instanced the difficulty that might arise in the case of a main road where the local authority might take one view and the borough council another. He would like to know whether in such a case the consent of the two authorities would be necessary?

Mr. Dickinson pointed out that under the clause, as it stood, the L.C.C. in London, in many instances, would be the local authority, but the borough council would be the road authority.

Mr. Tennant admitted that the question was a rather difficult and puzzling one. He was, however, informed by his advisers that Sec. 14 of the Act of 1899 gave county councils power to approve or disapprove of works in main roads. That answered Mr. Dickinson's point.

Sir W. Collins said his point was that in the case of a county authority taking a different view from the local authority through whose area the main road ran, would it be necessary to get the consent of both bodies, or would the consent of the local authority override the consent of the borough council?

Mr. Tennant said he was unable to give an answer to the question straight away. He should think that the county authority would have the ultimate authority in the case of a main road.

After further discussion the amendment was agreed to.

Mr. Holt moved to substitute the word "permit" for "authorise" in Sub-sec. 3. This was carried, and the clause as amended was agreed to.

Clause 5 was as follows:—"(1) Any local authority, company, or person authorised to supply electricity in any area may, with the consent of the Board of Trade, supply at any point within that area electricity for the purposes of haulage or traction on any railway, tramway, or canal situate partly within and partly without that area, and for the purposes of lighting vehicles and vessels used on any such railway, tramway, or canal; but the Board of Trade shall not in any case give any such consent until notice of the application for the consent has been given by advertisement or otherwise in such manner as the Board of Trade may direct, and an opportunity has been given to any person who appears to the Board to be affected of stating any objections he may have thereto. (2) The Board of Trade may by Provisional Order authorise any such local authority, company, or person so to supply electricity to be used for purposes incidental to the working or lighting of the railway, tramway, or canal, other than the purposes aforesaid. (3) A company, local authority, or body receiving a supply of electricity under this section shall not use the electricity in such manner as to cause, or to be likely to cause, any interference with Government observatories or laboratories, but this sub-section shall not apply to any such company, local authority, or body who, by any Act of Parliament or Order confirmed by or having the effect of an Act of Parliament containing provisions for the protection of such observatories or laboratories, are authorised to use electricity for the purposes for which a supply is authorised to be given under this section."

Mr. Holt moved a series of amendments to bring docks within the purview of the clause. He said the object of the clause was to give power to railways, tramways and canals which were situated in the areas of several electrical supply authorities to take their supply from any one they chose, and to use it freely over the whole of their system. He wanted to secure the same freedom for the dock authorities. He thought the request was a very reasonable one.

Mr. Scott said that, on behalf of the municipalities, he objected to the amendment. The principle involved was a very serious one—it was that local authorities having provided their undertakings to supply a district with electrical energy would find that the most profitable means of utilising their power would be taken away. It was quite possible that in many districts the companies might enter into arrangements with the municipalities, but it was not right that a private concern or company should be empowered to go out of its original district of supply to get its electricity.

Mr. Tennant appealed to the Committee to allow the clause to stand as printed. He said it had been the subject of much negotiation between the Board of Trade and the various interests concerned, and they had arrived at an agreement. The amendments were lost.

Mr. Scott then moved to omit sub-section (2) of the clause.

Mr. Tennant said he regarded the section as an important part of the clause. It was designed to give the Board of Trade power by provisional order to authorise a railway or other company to obtain electrical energy for other purposes than traction. The Board of Trade had spent a considerable time in negotiating with the different interests, and an arrangement had been arrived at which was embodied in the sub-section. It would obviously be a convenience to a railway or canal company to have its supply all from one source, and he did not think they ought to require a company which was getting its supply of electricity for traction purposes from one quarter to go elsewhere in order to light its workshops. The amendment was negatived.

Mr. Scott then moved to add the following words to the sub-section:—"But no such Provisional Order shall be granted for the supply of electricity to be used within any area in which any undertakers are authorised to supply and are supplying electricity except with the consent of such undertakers."

Mr. Tennant resisted the proposal on the ground that it would give undertakers an absolute veto, whether they were prepared to supply on reasonable terms or not. That was a wrong principle, to which he could not assent. The amendment was, by leave, withdrawn, and after some further discussion the clause was agreed to.

Clause (6) was as follows:—"(1) Where it is proved to the satisfaction of the Board of Trade that the occupier of any premises is desirous of obtaining a supply of electricity from any undertakers within whose area of supply those premises are not situate, and that either the premises are not within the area of supply of any undertakers, or that the undertakers within whose area of supply the premises are situate are not able or willing to give a supply to the premises, and cannot be compelled to do so on reasonable terms, the Board of Trade may, if the local authority within whose district the premises are situate consent, by order authorise the first-mentioned undertakers to give a supply to those premises on such terms and subject to such conditions as the Board think fit. (2) An order given by the Board of Trade under this section may, for the purpose of enabling a supply to be given thereunder, confer any such powers and impose any such duties on the undertakers as would have been conferred or imposed by the Electric Lighting Acts, and as might have been conferred or imposed by Provisional Order if the premises and the route along which lines are authorised to be laid for the purpose of giving the supply were within the area of supply of the undertakers, anything in the special Act or Order relating to the undertaking to the contrary notwithstanding. (3) If the undertakers on whom powers are conferred by an order under this section are not a local authority, the works and lines erected and laid under the powers so conferred shall, so long as the order remains in force, be deemed, for the purposes of the provisions as to purchase applicable to the undertaking, to form part of the undertaking within the district of the local authority which comprises the area of supply of the undertakers, or, if that area is comprised within the districts of more than one local authority, within such of those districts as the Board of Trade may determine."

Mr. Tennant in sub-section (1) moved to omit the words from "situate" to "terms" in order to add the following proviso:—"Provided that, if in the opinion of the Board of Trade any consent required by this sub-section is unreasonably withheld, the Board of Trade may proceed as if such consent had been given."

Mr. Abel Smith said he took it that if consent was not obtained the matter could be embodied in a private Bill and thrashed out in Parliament.

Mr. Tennant replied that it was no question of a Bill at all. The hon. member had misunderstood the object of the clause. It was simply to give a supply to places just outside the area of supply to people who could not get a supply from anywhere else. The amendment was carried, and with one or two consequential amendments the clause was ordered to stand part of the Bill.

Clause (7) was as follows:—"(1) Where any generating station, mains, or other works of a company used solely for supplying electricity within the district of a local authority are situated outside the district of that local authority, the generating station, mains, and other works so used shall for the purposes of the provisions of the Electric Lighting Acts, and any provisional order conferring on local authorities power to purchase undertakings, be deemed to be situated within the district of that local authority, and, where any generating station, mains, and other works are used solely for supplying electricity within the districts of two or more local authorities, but are not situated within any of those districts, the Board of Trade may, on the application of all or any of those authorities, by provisional order apply this provision subject to such adaptations as the circumstances of the case may require. Provided that this sub-section shall not, except by agreement between the local authority and the company concerned, apply to any generating station, mains, or other works authorised by a special Act passed before the passing of this Act. (2) Any local authority having power under the Electric Lighting Acts or any provisional order to purchase so much of the undertaking of a company as is within the district of that local authority may, with the consent of and upon such terms and conditions as may be approved by the Board of Trade, and, in the case of an undertaking authorised before the commencement of this Act, with the consent of the company, transfer their rights of purchase to any other local authority having power to purchase so much of the same undertaking as is within the district of that last-mentioned local authority, and the deed of transfer may contain such consequential provisions as may be necessary for giving effect to the transfer."

Mr. Scott moved to add the following addition to the clause:—"(3) Without prejudice to the foregoing provisions of this section, where the undertaking of a company is situate within the districts of two or more local authorities, the Board of Trade may, by provisional order transfer any rights of purchase vested in the local authority of any district in which part of the undertaking is situate to the local authority of any other district in which part of such undertaking is situate, but such provisional order shall not be made except with the consent of both such local authorities." He argued that, unless some such provision was put in, it might be possible for

a company to refuse to sell to a small local authority, or to impose such a heavy price as to make purchase impossible.

MR. TENNANT said the point was an important one, and one on which he could not see his way to meet his hon. friend. The companies that were formed before the passing of the Act raised their capital upon the idea that any interference with them would prejudice them and be very hard upon them. Great importance was attached by these undertakings to compensation for severance in the event of purchase. The amendment would do away with that, and it would not be putting the companies in a fair position. He hoped the hon. member would withdraw his amendment.

MR. SCOTT said he must press the amendment to a division, as the point was a most important one.

MR. HENDERSON, MR. COURTENAY WARNER, and MR. FALCONER spoke against the amendment.

MR. FALCONER was very doubtful if it was the right thing to give powers to the ratepayers to purchase an enterprise in the area of some other local authority. After further discussion, the amendment, on a division, was negatived by 14 votes to 9; and the clause was agreed to.

Clauses (8), (9), (10), (11) and (12), as follows, were agreed to without discussion:—

(8). "The Board of Trade may, with the concurrence of the Local Government Board, by provisional order make such provisions as appear to them necessary or expedient, by the constitution of a joint committee or joint board or otherwise, for the joint exercise of all or any of the powers under the Electric Lighting Acts, or this Act, or any Provisional Order, by two or more local authorities as respects any area of supply consisting of the whole or parts of the districts of those authorities, in any case where it appears to them that the joint exercise of those powers would be expedient, and any such provisional order may contain such provisions as may appear necessary or proper for adapting any of the provisions of the Electric Lighting Acts, or this Act, or any such Provisional Order, to the case of any committee or board so constituted."

(9). "The Board of Trade may grant a provisional order notwithstanding that the notice required by Sec. 4 of the Electric Lighting Act, 1882, to be given to a local authority on or before July 1st has not been given in the case of any local authority which waives its right to receive such a notice, and no such notice need be given to the local authority of a district in which it is not intended to take power to distribute electricity."

(10). "(1) With a view to making five years the ordinary period of revision of maximum price and allowing representations as to revision to be made by consumers, sub section (2) of Sec. 32 of the schedule to the Electric Lighting (Clauses) Act, 1899, shall, for the purpose of incorporation with any Act or order passed or confirmed after the passing of this Act, be read as if the words 'five years' were substituted for the words 'seven years,' and the words 'or such number of consumers, not less than 20, as the Board of Trade consider sufficient, having regard to the population of the area of supply,' were inserted after the words 'either the local authority or the undertakers.' (2) Where any Act or Provisional Order passed or confirmed before the commencement of this Act enables the Board of Trade to revise or vary any maximum prices to be charged for electricity, that Act or order shall be construed—(*a*) so as to enable the revision or variation to take place at an interval of five years after the commencement of the Act or order, or the last revision in cases where a longer interval is fixed by the Act or Order; and (*b*) so as to enable the power of revision or variation to be exercised on the representation of such number of consumers, not less than 20, as the Board of Trade consider sufficient, having regard to the population of the area of supply, in cases where under the Act or Order such a power either cannot be exercised on such a representation or can be exercised only on the representation of a number of consumers greater than 20.

(11). "(1) The sections set out in the Second Schedule to this Act shall be substituted for Secs. 49, 50, 51 and 53 of the schedule to the Electric Lighting (Clauses) Act, 1899, as incorporated with any Act or Order passed or confirmed after the commencement of this Act. (2) The provisions contained in the sections so set out shall, subject to such adaptations (if any) as may be necessary, be substituted for any corresponding provisions as to the use, examination, and certification of meters and their connection and disconnection with electric lines, contained in or incorporated with any special Act or Provisional Order relating to the supply of electricity passed or confirmed before the commencement of this Act.

(12). "For the purposes of Sec. 9 of the Electric Lighting Act, 1882, the accounts of any undertakers being a local authority shall be made up to March 31st in each year, and accordingly as respects those accounts, June 30th shall be substituted in that section for March 25th, and March 31st for December 31st: Provided that, if any such undertakers show to the Board of Trade that some other dates are, owing to special circumstances, more convenient in their case than March 31st and June 30th, the Board of Trade may substitute such other dates for the said March 31st and June 30th, and this section shall as respects those undertakers be construed with the substituted dates."

Clause (13) was as follows: "(1) If an auditor appointed by the Board of Trade to audit the accounts of any undertakers who are not a local authority reports to the Board that the undertakers have declined or neglected to comply with any of his recommendations or requirements, in so far as they relate to matters affecting the interests of the authority empowered to purchase the undertaking, or of the consumers, the Board may, if they think fit, after giving the undertakers an opportunity of being heard, make an order directing the undertakers to comply with such recommendations and requirements, with or without modification, as may be specified in the order, subject to an appeal to the Railway and Canal Commissioners, or any two of them, who shall finally decide the matter and confirm, annul or amend the order as they may think fit. (2) If the undertakers fail to comply with an order under this section, they shall, on conviction under the Summary Jurisdiction Acts, be liable to a fine not exceeding £10 and to a further fine not exceeding £5 for each day on which the offence is continued after conviction therefor."

MR. TENNANT proposed the following new clause in substitution of the above, and it was agreed to: "The Board of Trade shall from time to time make a return to Parliament giving such particulars as they may think proper with regard to the reports made by any auditors appointed by them to audit the accounts of any undertakers, and any action taken on such reports by the Board and by the undertakers."

Clauses (14) and (15) were agreed to without discussion:—

(14). "(1) A local authority, company or person who have obtained a licence, order or special Act for the supply of electricity shall not, by transfer or otherwise, divest themselves of any of the powers, rights or obligations conferred or imposed upon them by the Electric Lighting Acts, or by any licence, order or special Act, otherwise than under and in accordance with a provision contained in a licence, order or special Act authorising such a divestiture. (2) Sec. 11 of the Electric Lighting Act, 1882, shall be repealed from 'but no local authority' to the end of the section."

(15). "Notwithstanding anything in the Electric Lighting Acts, or in any Act of Parliament or Provisional Order, authorising an undertaking, a person shall not be entitled to demand or to continue to receive from undertakers authorised to supply electricity in any area a supply of electricity for any premises having a separate supply, unless he has agreed with the undertakers to pay to them such minimum annual sum as will give them a reasonable return on the capital expenditure, and will cover other standing charges incurred by them in order to meet the possible maximum demand for those premises: the sum to be so paid shall be determined in default of agreement by arbitration."

Clause (16) was as follows:—"(1) Where the undertakers are a local authority they may, through a contractor, but not otherwise, provide, let for hire, and fix, repair and remove, but shall not manufacture, lamps, electric lines, fuses, switches, fittings, lampholders, motors, and other fittings for lighting and motive power, and for all other purposes for which electrical energy can or may be used, and may provide all materials and work necessary or proper in that behalf, and with respect thereto may demand and take such remuneration or rents and charges and make such terms and conditions as may be agreed upon: Provided that—(*a*) The undertakers shall so adjust the charges to be made by them for any such fittings, or for the fixing, repairing, or removal thereof, as to meet any expenditure by them under the powers of this section in connection therewith (including interest upon moneys borrowed for those purposes and all sums applied to sinking fund for repayment of moneys so borrowed); (*b*) Every sum charged by the undertakers to a consumer in respect of the provision of such fittings, or the fixing, repairing, or removal thereof, shall be separately stated on every demand note delivered by the undertakers to the consumer; (*c*) The total sums expended and received by the undertakers in connection with the purposes in this section mentioned in each year (including interest and sinking fund) shall be separately shown in the published accounts of the electricity undertaking of the undertakers for that year; (*d*) Nothing in this section shall, in cases where within three months after the undertakers have obtained any loan necessary for the purpose of the undertaking there is or are no firm or firms carrying on the business of electrical contractors within the area of supply, prevent the undertakers themselves from exercising the powers given by this section without the employment of a contractor; (*e*) If the undertakers fail to comply with the provisoes (*a*), (*b*) and (*c*) of this section, they shall, on conviction under the Summary Jurisdiction Acts, be liable to a fine not exceeding £10, and to a further fine not exceeding £5 for each day on which the offence is continued after conviction therefor. (2) Any such fittings as aforesaid let for hire by any undertakers (whether a local authority or not) shall not be subject to distress or to the landlord's remedy for rent, or liable to be taken in execution under process of law or proceedings in bankruptcy against the person in whose possession the same may be; provided that such fittings are marked or impressed with a sufficient mark or brand indicating the undertakers as the actual owners thereof."

MR. JAMES PARKER moved to omit the words in Sec. 1 "through a contractor but not otherwise." The words he said were not in the original Bill, but were inserted by the House of Lords. He claimed that the local authorities and the municipalities had a right to supply electricity, and he did not see why in the case of lending fittings they should be called upon to introduce a contractor, any more than they should in the case of laying a tramway.

MR. TENNANT said it was quite true that the words "through a contractor" were inserted in another place. The clause as they introduced it was intended to embody a model or standard clause, and he was informed that 75 local authorities, including the London boroughs, had already got these powers to supply these fittings. It was proposed by the Bill to give all local authorities in future similar powers.

MR. COURTENAY WARNER said he had a request from the Rural District Council's Association, who were the last people in the world likely to support municipal trading, asking him to oppose the inclusion of the words, as it would be the small districts that would suffer. It was not the large towns who were likely to go in for municipal trading that would suffer, because they could easily get a contractor, but in small towns it would be very difficult to work this through a contractor.

MR. HOLT agreed that it was ridiculous that a local authority should not be able to supply those fittings without the intervention of a contractor, but he was afraid they had rather provoked the insertion of the words by the House of Lords, owing to the attitude they too often took up of objecting to competition. The amendment was then carried; and with one or two minor amendments moved by MR. SCOTT, the clause was agreed to.

Clauses 17 and 18 as follows were agreed to without discussion:—(17) "(1) Twenty-four hours' notice in writing shall be given to the undertakers by every consumer before he quits any premises supplied with electrical energy by the undertakers, and, in default of such notice, the consumer so quitting shall be liable to pay to the undertakers the money accruing due in respect of such supply up to the next usual period for ascertaining the register of the meter on such premises, or the date from which any subsequent occupier of such premises may require the undertakers to supply electrical energy to such premises, whichever shall first occur. (2) Notice to the effect of this section shall be endorsed upon any demand note for charges for electrical energy."

(18) "The undertakers may refuse to supply electrical energy to any person whose payments for the supply of electrical energy are for the time being in arrear (not being the subject of a *bonâ fide* dispute), whether any such payments be due to the undertakers in respect of a supply to the premises in respect of which such supply is demanded or in respect of other premises."

Clause (19) read as follows:—"Electrical energy shall be deemed to be goods, wares, or merchandise for the purposes of Sec. 59 of the Stamp Act, 1891 (which makes certain contracts chargeable with stamp duty as conveyances on sale), and also for the purposes of the exemption numbered 3 under the heading 'Agreement or any memorandum of an agreement' contained in the First Schedule to that Act."

MR. SCOTT moved to add the following words at the end of the clause:—"An agreement for the supply of electrical energy in pursuance of which sums are to be paid at stated periods as the price of the energy supplied or as fixed or minimum charges in respect of such supply, and an agreement for payment of a minimum annual sum in regard to a supply of energy, shall not be deemed to be a bond, covenant, or instrument of any kind whatsoever within the meaning of the Stamp Act, 1891."

MR. TENNANT said the amendment was really an amendment of the Stamp Act, and he hoped the Committee would reject it in connection with the present Bill. On a division the amendment was negatived by 18 votes to 4, and the clause was agreed to.

Clause (20), as follows, was agreed to without discussion:—"For removing doubts, it is hereby declared that so much of any provisional order or special Act, or of the schedule to the Electric Lighting (Clauses) Act, 1899, as incorporated with any such order or Act, as prohibits undertakers from associating themselves with any company or person supplying energy under any licence, provisional order, or special Act unless the undertakers are authorised by Parliament to do so, shall not be construed as prohibiting the undertakers from taking a supply of electricity in bulk from any company or person authorised to give such a supply."

Clause (21) was as follows:—"(1) With a view to the protection of the royal palaces, parks, and gardens, museums and other public buildings, and their contents (in this section referred to as 'the protected premises'), the Commissioners of Works and their engineer, or other officer duly authorised in writing under the hand of their secretary, may from time to time enter upon and inspect any generating station of any undertakers, and if on such inspection it should appear to the Commissioners that proper precautions are not being adopted for the due consumption of smoke, and for preventing as far as reasonably practicable the evolution of oxides of sulphur, and generally for the prevention of nuisance in relation to the protected premises, they may, without prejudice to any other remedy, require the undertakers forthwith to carry out such works and to do such things as are necessary in the circumstances. (2) The undertakers shall give all reasonable facilities for such inspection to the Commissioners and their engineer or other officer as aforesaid. (3) Any dispute arising between the Commissioners and the undertakers in relation to any of the provisions of this section shall be determined by arbitration."

On the motion of MR. HENDERSON, it was agreed to omit the station of the Westminster Electric Supply Corporation, Ltd., at Horseferry Road, Westminster, from the provisions of the section, and the clause, as amended, was agreed to.

Clause (22) was as follows: "(1) Nothing in any provisional order, whether confirmed before or after the passing of this Act, shall in any way limit or affect the powers of any county council to re-build, alter, widen, or repair the structure of any bridge or to divert, widen, raise, drain or improve any road repairable by them upon which any work authorised by the order may be constructed, or impose upon the county council any liability which was not by law imposed upon them prior to the commencement of the order. (2) If at any time the county council require to carry out works for rebuilding, altering, widening or repairing any bridge, or for diverting, widening, raising, draining or improving any road, which might involve interference with any portion of the undertaking authorised by the order, they shall, prior to the commencement of the works, give the undertakers one month's notice of their intention to carry out the works, and if, in order to avoid interruption to the supply of electrical energy, it is, in the opinion of the county council, necessary temporarily to remove any electric lines or works belonging to the undertakers from such bridge or road, then the undertakers shall (and they are hereby authorised so to do at their own expense) temporarily carry their electric lines across such bridge or along such road overhead or at the side thereof in such a manner as will not be a danger or inconvenience to the public or unreasonably interfere with the works to be carried out by the County Council. (3) When the rebuilding, altering, widening, or repairing of such bridge, or the diverting, widening, raising, draining, or improvement of such road has been completed, the undertakers shall have the same rights and powers with regard to such bridge or such road and its approaches as they had before the works were carried out. Wherever a main road is carried over a railway by a bridge maintained by the railway company all the rights, powers, privileges, and exemptions conferred upon County Councils, and the benefit of all obligations imposed upon the undertakers by this section, shall for the purposes of rebuilding, altering, widening, or repairing such bridge be extended to the railway company, and may be exercised and enjoyed by them as fully as if the railway company were a County Council and the bridge were a bridge repairable by such Council. (4) If any dispute arises between the County Council or a railway company as the case may be and the undertakers with regard to this section, it shall be determined by arbitration."

MR. TENNANT moved a series of amendments which were agreed to, deleting the words in the clause relating to roads. He explained that the original idea was to protect the County Councils from having to pay for damage to lines over county bridges, but he did not see his way to include all roads. The clause was then agreed to.

Clause (23) as follows was adopted without discussion:—"Nothing in this Act shall enable the Board of Trade by Provisional Order to authorise the compulsory acquisition of any land which, at the date of the first publication of the notice for the Order, belongs to any gas undertakers and is used or authorised to be used by them for the purposes of their undertaking."

Clause (24) was as follows:—"In this Act, unless the context otherwise requires, the expression 'Provisional Order' means a Provisional Order under the Electric Lighting Acts; the expression 'Electric Lighting Acts' means (*a*) as respects England and Ireland, the Electric Lighting Acts, 1882 and 1888: and (*b*) as respects Scotland, the Electric Lighting Acts, 1882 and 1888, the Electric Lighting (Scotland) Act, 1890, and the Electric Lighting (Scotland) Act, 1902; the expression 'authorised' means authorised by Act of Parliament or Provisional Order; the expression 'area of supply' means any area within which any local authority, company or person is authorised to supply electricity; the expression 'undertakers' means any local authority, company, or person, authorised to supply electricity. The expression 'road' includes any street as defined by the Electric Lighting Act, 1882. The expression 'generating station' includes any station for generating, transforming, converting, or distributing electricity. The expression 'to supply electricity in bulk' means to supply electricity—(*a*) to any local authority, company, or person authorised to distribute electricity to be used for the purposes of distribution; or (*b*) to any local authority authorised by any general or special Act to undertake or contract for the lighting of streets, bridges, or public places, to be used for the purposes of lighting streets, bridges, and public places." The clause was agreed to.

Clause (25) was as follows:—(1) In the application of this Act to Scotland the Secretary for Scotland shall be substituted for the Local Government Board as respects Provisional Orders relating to Scottish local authorities, and May 15th shall be substituted for March 31st, and August 1st shall be substituted for June 30th. (2) In the application of this Act to Ireland the Local Government Board for Ireland shall be substituted for the Local Government Board as respects Provisional Orders relating to Irish local authorities."

The clause was agreed to with the addition of the following words:—"Sec. 99 of the Burgh Police (Scotland) Act, 1892, as applied by Sec. 44 of the Local Government (Scotland) Act, 1894, shall be read as if the words 'subject to the provisions of the Electric Lighting Act, 1882, or any Act or Acts amending or superseding the same,' were repealed."

The last clause (26) as follows was unanimously agreed to:—"(1) This Act may be cited as the Electric Lighting Act, 1909. (2) This Act and the Electric Lighting Acts shall be construed together as one Act, and may be cited as the Electric Lighting Acts, 1882 to 1909. (3) This Act shall come into operation on the first day of April, 1910."

MR. FALCONER proposed the following new clause, which was accepted by Mr. Tennant on behalf of the Government, and agreed to by the Committee:—"All electrical lines, fittings and other apparatus and appliances let by any undertakers on hire or belonging to the undertaker, but being in or upon premises of which the undertaker is not in possession, shall, whether they be or be not fixed or fastened to any part of any premises in or upon which they may be situate, or to the soil under any such premises, at all times continue to be the property of, and be removable by, the undertaker, and Secs. 24 and 25 of the Electric Lighting Act, 1882, shall extend and apply to all such fittings, apparatus and appliances. Provided that such electric lines, fittings and apparatus or appliances have upon them respectively a distinguishing metal plate affixed to a conspicuous part thereof, or a distinguishing brand or other mark conspicuously impressed or made thereon, sufficiently indicating the undertaker as the actual owner thereof. For the purposes of this section electric lines, fittings, apparatus and appliances, articles and things disposed of by the undertakers on terms of payment by instalments shall, until the whole of the instalments have been paid, be deemed to be articles and things let on hire by the undertakers. Nothing in this section shall affect the amount of the assessment for rating of any premises upon which any electric lines, fittings and apparatus are or shall be fixed."

The Bill was then ordered to be reported to the House.

Gateshead and District Tramways.

THIS Bill was again before the Unopposed Bills Committee of the House of Commons on Monday. The consideration of the measure had previously been adjourned, to allow of the parties consulting with the Local Government Board on various matters.

MR. KENNEDY, Parliamentary agent for the promoters, said that under Clause 23 of the Bill the company could enter into an agreement with certain specified local authorities for the purpose of the construction and working of the respective undertakings.

MR. MOON, K.C., Speaker's counsel, objected to this provision, as he said the corporations were getting in a company's Bill powers which they could exercise without reference to their ratepayers.

MR. KENNEDY said that was so, and he had precedents for it in the clauses of the Lancashire Bill of 1903, Nottingham Bill, 1904, and Folkestone, 1906. The Nottingham Bill, however, allowed the leasing, working and maintaining of the lines, but not the construction.

After further discussion, the word "construction" was deleted.

On Clause 23, MR. MOON said that it gave the local authorities powers to sell their undertakings without any power of resumption, besides various other matters. On his suggestion the clause was altered so that the effect of it was to enable the company to buy, but not the corporations to sell; if the corporations wanted to sell they would have to come to Parliament.

MR. KENNEDY explained that Clause 25 gave the company power to use the trackless trolley system.

In answer to the CHAIRMAN, the agent said that the system was not used in England, but there were instances of the system being used in Italy and Germany. There was no case where a tramway track had been taken up and this system substituted.

MR. HILTON, replying to the CHAIRMAN, said that the company had no particular object in view as to where to lay the system.

The CHAIRMAN, after further discussion, said that the promoters had not made out any case for these powers, and the Committee could not see their way to grant them.

MR. HILTON then formally proved the preamble, and the Bill was ordered to proceed as amended.

West Kent Electric Power Co.

ON Monday the Select Committee of the House of Commons, presided over by Mr. A. Emmott, which considers Unopposed Bills, passed the measure promoted by the West Kent Electric Power Co., Ltd.

MR. CRIPPS, Parliamentary Agent, explained the provisions of the Bill, which, he said, authorised the transfer to the promoters of the powers, and all the rights, granted to the Kent Electric Power Co. in 1902, for the supply of electricity "within the West Kent area of supply." The majority of the gentlemen associated with the project were directors of the South Metropolitan Electric Co., and it was that company that was providing the capital.

MR. MARTIN, the secretary to the company, formally proved the preamble of the measure, and the Bill was ordered to proceed.

Oldham Corporation.—This Bill, after two days' consideration, was passed on the 21st inst. by the Select Committee of the House of Lords, presided over by Lord Clifford of Chudleigh. The Bill, which has already passed the House of Commons, provides for the extension of the limits of supply of electricity, and to places outside the area of the borough, the construction of tramways and waiting rooms, at an estimated cost of £17,550; and the electrical equipment of such tramways at an estimated cost of £4,600. The proposal to supply electricity outside the borough was opposed by the Lancashire Power Co., who contended that they were already in the area. The Committee, after hearing evidence and arguments from counsel, passed the preamble, and as to the electrical proposals inserted the "Kitson" clause in the Bill for the protection of the Power Co.

Holywood Tramway Bill.—This Bill, promoted by the Holywood Tramway Co., was before the Select Committee of the House of Lords, presided over by Lord Clifford of Chudleigh, on the 22nd inst. The measure provides for an extension of the period allowed for the construction of the tramways authorised under the company's Act of 1904. When the Committee met, Mr. Fitzgerald, K.C., submitted that the opponents to the Bill, the Belfast and County Down Railway Co., had no *locus standi* to be heard. After hearing arguments on either side, the Committee upheld the promoters' contention. The measure thereupon became an unopposed Bill, and was referred to the Committee on Unopposed Bills. It has since passed the third reading in the House of Lords.

Central London Railway.—This Bill has passed third reading in the House of Lords.

Pump Contracts. — We understand that MESSRS. WILLANS & ROBINSON are already making headway in their manufacture of pumps to Mr. Orten-Böving's designs, and they have just received an order from the Lambton Collieries for a pump to deliver 2,500 gallons per minute against a head of 315 ft. at 1,170 R.P.M. Another order, booked some time ago, is for two pumps for Messrs. Isaac Holden & Sons, of Rheims. Each of these pumps will deliver 400 gallons per minute against a head of 170 ft. at 950 R.P.M. These pumps are placed at a depth of 120 ft., and are driven by gearing and vertical shafting more than 100 ft. in length, the narrowness of the pit not allowing space for electrical motors.

FOREIGN AND COLONIAL TARIFFS ON ELECTRICAL GOODS.

FINLAND.—The following goods are free of duty:—Instruments of navigation, such as compasses, sounding apparatus, signal lamps, side-lights, &c.; pottery of stoneware and fireclay for use in metallurgy, &c.; rails, fishplates and plates, tramway rails.

The following duties are payable per 100 kg.:—

	Marks.
Lead in ingots, rolls, plates and piping of all kinds ...	60
Iron, wrought, or rolled, in bars not exceeding 29·7 cm. in width, corner and angle iron, T, H and similar iron	6·50
Iron and steel pipes and conduits, drawn or welded ...	2·40
Copper and other common metals, in ingots, blooms, bars, plates, tubes, pipes, filings and scrap	5·90
Tin in ingots, bars, plates, &c.	2·90
Zinc " " " "	2·90
India-rubber, caoutchouc and gutta-percha without the admixture of other materials...	58 80
India-rubber, caoutchouc and gutta-percha with admixture of other materials	105 90
Transmission belting of leather	14 70
Physical, chemical, optical, &c., instruments not specially mentioned	105 90
Copper and brass wire	23·50
Iron and steel axles and tires for locomotives and railway carriages	11 80
Iron and steel castings for buildings, hydraulic works, &c.	11 80
Bronzed cast-iron parts for lamps	29·40
Wire of iron or steel of a diameter of less than 6 mm.:	
Not coated with other metals	14·10
Coated with other metals	17 60
Steam boilers, cisterns, &c.	11 80
Locomotives, portable steam engines, turbines, mills and sawmills, blast engines and parts thereof:	
Of iron and steel with integral parts of copper, &c. ...	14 70
Of copper, &c., even if iron or steel is combined therewith in a small quantity	58 80
Electrotechnical machines and apparatus as well as parts and accessories thereof	47 10
Electrical machines and motors in which iron is the chief component material, and which weigh over 100 kg.	14·70
Electrodes	12
Cables and insulated wire for electrochemical purposes	12
Accumulators and galvanic batteries	12
Detached parts and accessories for batteries	12

Finnish mark = 9$\frac{5}{16}$d., or 25 marks = £1.

Kilogram = 2 204 lb.

Accidents in Coal Mines.—The general report of the Chief Inspector of Mines in relation to the working of the mines and quarries in the United Kingdom during 1908 contains particulars of the accidents attributed to the use of electricity. We have compiled the following table from the report, and have given the corresponding figures from the similar Blue Book issued for 1907:—

	1908.	1907.
COAL MINES REGULATION ACT.		
Separate fatal accidents underground ...	11	10
" " " on the surface ...	4	Nil
Non-fatal accidents underground	21	16
" " " on the surface ...	11	8
METALLIFEROUS MINES REGULATION ACT.		
Non-fatal accidents underground ...	1	Nil
" " " on the surface ...	1	Nil
QUARRIES ACT.		
Non-fatal accidents (outside quarry) ...	1	Nil

Although all accidents of the above classes are required to be intimated to the Inspector, it appears that only 15 out of the 21 of the non-fatal kind in the case of underground coal working were reported to the official. It should be mentioned that with one exception all the figures apply to the number of accidents, and they also represent the actual number of persons involved in them. The exception relates to the number of non-fatal underground accidents in coal mines in 1907, which, although returned at 16, is stated to have resulted in injuries to 22 persons.

"Efesca" Tungsten Lamps.— Sending us a preliminary list, P. 576, giving particulars of their metallic-filament lamps, MESSRS. FALK, STADELMANN & CO., LTD., of 83-87, Farringdon Road, E.C., inform us that they now have large stocks of 16-C.P. low-voltage and 32-C.P. high-voltage "Efesca" tungsten lamps, a complete range of the various other candle-powers in voltages from 25 to 260, and also high-candle-power lamps in 100, 200, 300 and 400-C.P. sizes.

NEW PATENTS APPLIED FOR, 1909.

(NOT YET PUBLISHED.)

Compiled expresaly for this journal by MESSRS. W. P. THOMPSON & Co., Electrical Patent Agents, 322, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

16,205. "Improvements in direct current and alternating current balancers, boosters, and auto-transformers." A. M. TAYLOR. July 12th.

16,222. "Arc lights with permanent metallic electrodes." H. A. KENT. July 12th.

16,224. "Improvements in the production of compounds of oxygen and nitrogen by electrical means." P. BUNET and A. BADIN. (Date applied for under Sec. 91 of the Act, August 17th, 1908, being date of application in France.) July 12th. (Complete.)

16,225. "Improvements in apparatus for the production of electric arcs intended for the formation of compounds of oxygen and nitrogen." P. BUNET and A. BADIN. (Date applied for under Sec. 91 of the Act, November 30th, 1908, being date of application in France.) July 12th. (Complete.)

16,273. "Improvements in automatic electric switches." T. FERGUSON. July 13th.

16,292. "Electric arc lamps." P. A. MESSENIE and W. E. SLAUGHTER. July 13th. (Complete.)

16,309. "Production of lightning effects on the stage by means of high-tension currents of high frequency." E. ZHANIEL, née C. FEHER. (Date applied for under Sec. 91 of the Act, July 16th, 1908, being date of application in Germany.) July 13th. (Complete.)

16,328. "Improvements in or relating to the manufacture of incandescence lamp filaments." C. H. WEBER. July 13th. (Complete.)

16,331. "Electric transmission for motor vehicles." W. MORRISON. July 13th. (Complete.)

16,332. "Improvements in electricity meters." W. H. JOHNSON and A. M. BILLINGTON. July 13th.

16,341. "Improvements relating to the lighting of gas burners electrically." M. DELAGE and P. WOOG. (Date applied for under Sec. 91 of the Act, July 13th, 1908, being date of application in France.) July 13th. (Complete.)

16,405. "Combined massaging and magneto-electric machine." F. BURKE. July 14th.

16,415. "Improvements in valves or rectifiers for high alternating potential differences." E. WILSON and W. H. WILSON. July 14th.

16,457. "Improvements in or relating to apparatus for winding frames, coils and similar parts of electric machinery with insulating material, and for manufacturing structures from the same material." E. HAEFELY. July 14th. (Complete.)

16,475. "Multiplex accumulator." H. G. CARTER. July 15th.

16,476. "Improvements in electrically-driven centrifugal fans." ALLPAYS AND ONIONS PNEUMATIC ENGINEERING CO., LTD., and E. L. JOSELIN. July 15th.

16,520. "Improvements in connection with telephone and other similar mouthpieces." W. B. TATTERSALL. July 15th.

16,522. "Improvements in methods of charging and discharging electric accumulators or secondary batteries." A. M. TAYLOR. July 15th.

16,537. "Improvements in and relating to electric motor starting switches." SIEMENS BROS. DYNAMO WORKS, LTD., and E. SCHUPP. July 15th. (Complete.)

16,538. "Improvements in and relating to the bearings of electricity meters." SIEMENS BROS. DYNAMO WORKS, LTD. (Siemens Schuckertwerke G.m.b.H., Germany.) July 15th. (Complete.)

16,547. "Improvements in electric heaters." F. W. F. ROSS. July 15th.

16,552. "Improvements in and relating to electrical generating plant." J. STONE & Co., LTD., and C. H. VIDAL. July 15th.

16,558. "Improvements relating to devices for producing electrical oscillations." W. E. LAKE. ("Polyfrequenz" Elektricitäts-Ges. m.b.H., Germany.) July 15th. (Complete.)

16,559. "Improvements in or relating to the control of induction motors." M. MILCH. July 15th.

16,584. "Improvements in or appertaining to electric terminals or binding screws." G. W. MICKLETHWAIT. July 16th.

16,607. "Improvements in portable magnetic compasses." L. W. P. CHEIWYND, KELVIN & JAMES WHITE, LTD., and F. W. CLARK. (Application for Patent of Addition to No. 21,634, of 1908.) July 16th.

16,630. "Improvements in and relating to the regulation of electric installations." AKT.-GES. BROWN, BOVERI ET CIE. (Date applied for under Sec. 91 of the Act, September 16th, 1908, being date of application in Germany.) July 16th. (Complete.)

16,631. "Improvements in and relating to the control of dynamo-electric machinery in electric lighting installations worked with accumulators." AKT.-GES. BROWN, BOVERI ET CIE. (Date applied for under Sec. 91 of the Act, September 14th, 1908, being date of application in Germany.) July 16th. (Complete.)

16,641. "Portable telephone transmitter mouthpiece attachment." W. AITKEN and BRITISH INSULATED AND HELSBY CABLES, LTD. July 16th.

16,642. "Improvements in telephone switchboards." W. AITKEN and BRITISH INSULATED AND HELSBY CABLES, LTD. July 16th.

16,643. "Improvements in telephonic sub-station switching systems." W. AITKEN and BRITISH INSULATED AND HELSBY CABLES, LTD. July 16th. (Complete.)

16,645. "Improvements in and relating to electric distribution systems." DALZIEL'S CONSTANT VOLTAGE PATENTS, LTD., and J. DALZIEL. July 16th.

16,649. "Improvements in quick make and break electric switches." A. WEST. July 16th.

16,662. "Improvements in or relating to the manufacture of electrical condensers and similar apparatus." J. A. L. DEARLOVE and S. G. BROWN. July 16th.

16,678. "Improvements in multiple electric switches and automatic circuit-breakers especially applicable to motor starters." P. S. BROOK and J. A. HIRST. July 17th.

16,679. "Improvements in electric batteries." F. RICHMOND. July 17th.

16,682. "Improvements in trolley heads employed for electric traction." F. JACKSON. July 17th.

16,690. "Improvements in portable electric hand lamps." H. O. WRAITH. July 17th.

16,702. "Improvements in or relating to electric batteries." H. H. SIMMONS. July 17th.

16,728. "Improvements in and relating to means for making electrical connections." A. VANDAM. July 17th.

16,732. "Improved amplifying device for use in high-tension electric spark-ignition apparatus." M. DELAGE and P. WOOG. (Date applied for under Sec. 91 of the Act, October 12th, 1908, being date of application in France.) July 17th. (Complete.)

PUBLISHED SPECIFICATIONS.

Copies of any of the Specifications in the following list may be obtained of MESSRS. W. P. THOMPSON & Co., 322, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1908.

ELECTRIC BATTERIES. F. Richmond. 9,900. May 7th. (Post-dated November 9th, 1908.)

DEVICES FOR OPERATING AUTOMATIC SWITCHES APPLICABLE FOR USE WITH ELECTRIC TRANSFORMERS. L. Sunderland and G. C. Pillinger. 13,185. June 20th.

ELECTRO-MAGNETIC SWITCH. R. F. Venner, R. C. Griesbach and P. K. Morris. 13,327. June 23rd.

ROTORS OF DYNAMO-ELECTRIC MACHINES. Lancashire Dynamo and Motor Co. and R. G. McLeod. 13,504. June 25th.

CONTROL OF ELECTRIC MOTORS. M. Hattenheim. 13,620. June 25th.

MAGNETIC BRAKES FOR RAILWAY AND TRAMWAY VEHICLES. O. H. Baldwin. 13,781. June 29th.

ELECTRIC METERS. British Thomson-Houston Co. and A. J. Martin. 13,788. June 29th.

SWITCHES FOR SUPPLYING ELECTRIC POWER. G. Cooper and F. C. Sharp. 14,773. July 11th.

ELECTRIC ACCUMULATORS. Van Raden & Co. and M. Metz. 15,888. July 21st.

TRANSFORMATION OF ELECTRIC CURRENTS. H. Taylor. 15,522. July 22nd.

ELECTRIC TELEGRAPHS. E. Tyer and J. R. Dobson. 17,143. August 14th.

MEANS FOR INDICATING AND RECORDING CURRENT LEAKAGE IN ELECTRIC CIRCUITS OR MOTORS. Ashington Coal Co. and T. McKie. 17,161. August 14th.

SPARKING PLUGS FOR INTERNAL-COMBUSTION ENGINES. O. H. O. B. Payne. 17,912. August 26th.

CONSTRUCTION OF REGULATING SWITCH. A. E. Gott. 19,757. September 21st.

DIRECT-CURRENT DYNAMO-ELECTRIC MACHINERY. A. H. Midgley and G. A. Vandervell. 21,936. October 16th.

DIRECT-CURRENT DYNAMO-ELECTRIC MACHINERY. A. H. Midgley and G. A. Vandervell. 21,938. October 16th.

SUPPLY AND REGULATION OF THE ELECTRIC ENERGY EMPLOYED IN THE OPERATION OF ARC LAMPS USED IN SEARCHLIGHTS AND LIKE APPARATUS. British Thomson-Houston Co. and A. A. Pollock. 23,070. October 29th. (Application for Patent of Addition to No. 4,379 of 1905.)

HIGH POTENTIAL RECTIFYING SWITCH. H. C. Snook. 23,489. November 3rd. (Date applied for under International Convention, July 20th, 1907.) (Originally included in No. 13,854 of 1908.)

ELECTRICAL APPARATUS FOR WORKING PLANING MACHINES AND OTHER RECIPROCATING TOOLS. Vickers, Sons & Maxim, Ltd., and A. D. Williamson. 23,908. November 7th.

ALTERNATING-CURRENT METERS. Siemens Schuckertwerke Ges. 27,343. December 16th. (Date applied for under International Convention, December 17th, 1907.)

SINGLE-PHASE ALTERNATING-CURRENT METERS. H. Aron Elektricitäts Zählerfabrik Ges. 28,271. December 28th. (Date applied for under International Convention, October 9th, 1908.)

MEANS FOR STARTING AND REGULATING COMPENSATED ELECTRIC REPULSION MOTORS. Allmänna Svenska Elektriska Aktie-bolaget. 25,597. November 26th. (Date applied for under International Convention, November 27th, 1907.)

TIME SWITCHES FOR GAS OR WATER COCKS OR VALVES AND ELECTRIC SWITCHES. A. Raasch. 27,207. December 15th.

APPARATUS FOR TRANSMITTING POWER AT A REDUCED AND VARIABLE SPEED BY MEANS OF DYNAMO-ELECTRIC GENERATORS AND MOTORS. M. Johannet. 28,438. December 30th. (Date applied for under International Convention, February 3rd, 1908.)

1909.

AUTOMATIC ELECTRIC SIGNALS FOR TRAMWAYS, RAILWAYS, AND THE LIKE. A. I. Rogers and Brecknell, Munro & Rogers, Ltd. 319. January 6th.

COOLING OF THE WINDINGS OF DYNAMO-ELECTRIC MACHINES. Siemens Bros. Dynamo Works and M. Kloss. (Partly by Siemens Schuckertwerke Ges. 1,679. January 23rd.

METHODS OF ELECTRICALLY LIGHTING MOTOR CARS. J. Polkey. 4,117. February 19th.

ELECTRIC CUT-OUTS. T. E. Murray. 4,228. February 20th.

CONTROL OF ELECTRIC MOTORS. Allgemeine Elektricitäts Ges. 5,818. March 4th. (Date applied for under International Convention, March 4th, 1908.)

INDUCTION COILS. A. W. Sharman. 6,962. March 23rd. (Date applied for under Rule 13, June 4th, 1908.)

ARRANGEMENTS FOR THE COOLING OF COMMUTATORS OF DYNAMO-ELECTRIC MACHINES. Siemens Bros. Dynamo Works and F. F. O'Hagan. (Partly Siemens Schuckertwerke Ges.) 10,067. April 28th.

SUPPORTS FOR ELECTRIC LAMP FILAMENTS. Soc. Française d'Incandescence par le Gaz (Système Auer). 11,149. May 11th. (Date applied for under International Convention, July 13th, 1907. Originally included in No. 12,720/08.)

APPARATUS FOR CONTROLLING ELECTRIC MOTORS. H. E. Day. 78. January 1st.

CONTINUOUS-CURRENT DYNAMO-ELECTRIC MACHINES. P. Marchal. 590. January 9th. Date applied for under Rule 13, August 14th, 1908.

ELECTRIC SERVO-MOTORS. M. Conade. 2,374. February 1st. (Date applied for under International Convention, February 25th, 1908. Application for Patent of Addition to No. 3,9.7/07.)

VENTS FOR USE WITH ELECTRIC ACCUMULATORS OR BATTERIES. W. Cowderoy and Beason Manufacturing Co. 2,379. February 1st.

ELECTRIC LIQUID HEATER. W. F. Cutler and T. Barnett. 3,023. February 8th.

ELECTRICAL INDUCTION FURNACES. C. Grunwald. 3,699. February 13th. (Date applied for under International Convention, May 7th, 1908.)

CARBONIC ACID ENGINE IN WHICH THE CARBONIC ACID IS HEATED BY ELECTRICITY. L. Horst. 4,576. February 24th.

SPARK PLUGS. G. P. B. Hoyt and E. L. Sinsabaugh. 5,893. March 11th.

ELECTRICAL INDUCTION FURNACES. C. Grunwald. 7,396. March 27th. (Date applied for under International Convention, August 15th, 1908.)

LIGHTNING ARRESTER FOR OVERHEAD LINES. G. Krause. 9,967. April 27th. (Date applied for under International Convention, July 29th, 1908.)

ELECTRICALLY HEATED COOKING APPARATUS. W. A. Lowden. 12,985. June 2nd. (Date applied for under Rule 13, June 12th, 1908.)

Bradford-on-Avon.—The R.D.C. has decided to oppose the application of the Western Electric Distributing Corporation for a prov. order for E.L., and to draw the attention of the B. of T. to the fact that the company failed to carry out a previous order, which was cancelled. The U.D.C. has adopted a similar course.

Central America.—A contract has been concluded between the municipality of San Miguel, Salvador, and private individuals for supplying the town with electric light.—*Board of Trade Journal.*